OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

NOVEMBER 14, 1949
VOLUME 38, NO. 23

AMERICAN DYESTUFF REPORTER

DEVOTED TO TEXTILE CHEMISTRY • BLEACHING • DYEING • PRINTING • FINISHING

First came the...

Solophenyl Color series for Cotton and Rayon. Only the fastest to light carry the name.

Now...

Geigy makes available the Cuprophenyl (*) series of Direct colors for Cotton and Rayon—a series, which, when aftertreated with copper sulphate and acetic acid, gives outstanding resistance to washing, water bleeding, salt water, dry and wet cleaning and light, with light fastness and shade being minorly affected by the popular anti-crease finishes.

Write Geigy immediately for literature on the latest developments in the Cuprophenyl series.

* *Registered U. S. Patent Office.*

Geigy

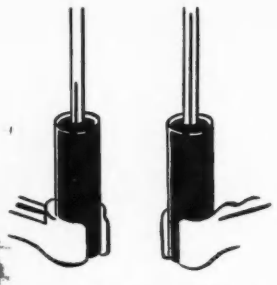
Dyestuff Makers Since 1859

GEIGY COMPANY, Inc.

89-91 BARCLAY STREET, NEW YORK 8, NEW YORK

BRANCH OFFICES: Boston • Charlotte, N. C. • Chicago • Los Angeles • Philadelphia
Portland, Ore. • Providence • Toronto

IN GREAT BRITAIN: The Geigy Co., Ltd., National Buildings, Parsonage, Manchester



SPEEDIER APPLICATION in the wetting of textiles is achieved with DECERESOL Wetting Agents. Low surface tension of liquid containing DECERESOL OT is illustrated here by the capillary method. Tube on left contains a 0.01% solution of DECERESOL OT 100%, tube on right plain water.

Win both eye and hand approval with NO-ODOROL* finishing oils

Today the hand is often quicker than the eye in deciding a sale. For women are becoming increasingly finish conscious.

Cyanamid offers a full line of specialties that helps textile manufacturers achieve superior processing results. NO-ODOROL Finishing Oils, as an example, are extremely effective as softening agents for cotton, silk and rayon fabrics, and for hosiery and knitted fabrics. Grades are available for use on the finest fabrics as well as for heavy work clothing fabrics—priced to meet every requirement, with quality always maintained.

NO-ODOROL Finishing Oils are only one of a varied line of Cyanamid sulfonated oils and other textile specialties which include penetrants, softeners, finishes, sizing compounds, DECERESOL* Wetting Agents, PARAMUL* 115 Water Repellent and others. Our technical staff and research facilities are at your service in applying these products to your business.

Write for a copy of our booklet, "Textile Specialties".

**Reg. U. S. Pat. Off.*

WATER BORNE STAIN RESISTANCE PLUS water repellency can be imparted in one treatment with Cyanamid's PARAMUL 115, a semi-durable water repellent. Easy and economical to use, it is equally suitable for cotton, rayon, linen and wool.

AMERICAN Cyanamid COMPANY

INDUSTRIAL CHEMICALS DIVISION, DEPT. E11

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

American Dyestuff Reporter, Vol. 38, No. 23, November 14, 1949. Published every other Monday. Copyright 1949, by Howes Publishing Co., Inc., One Madison Ave., New York 10, N. Y. Domestic subscription, $5.00; Canadian, $6.00. Foreign, $10.00. Entered as second-class matter, Nov. 6, 1919, at the New York, N. Y., Post Office, under the act of March 3, 1879.

Coprantine Colors

These colors . . .

are a new class of substantive dyestuffs. They give by the usual direct color procedure, dyeings which when aftertreated, combine with copper salts to form exceedingly stable complex compounds of excellent fastness to both light and washing . . . a particularly effective aftertreatment is the new Coprantine Fixer WF.

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WASH AND IGHT NESS
ON
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WOOL BLENDS ACETA LENDS
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ESPECIALLY RECOMMENDED FOR PACKAGE MACHINE DYEING

DYE INTERMEDIATES

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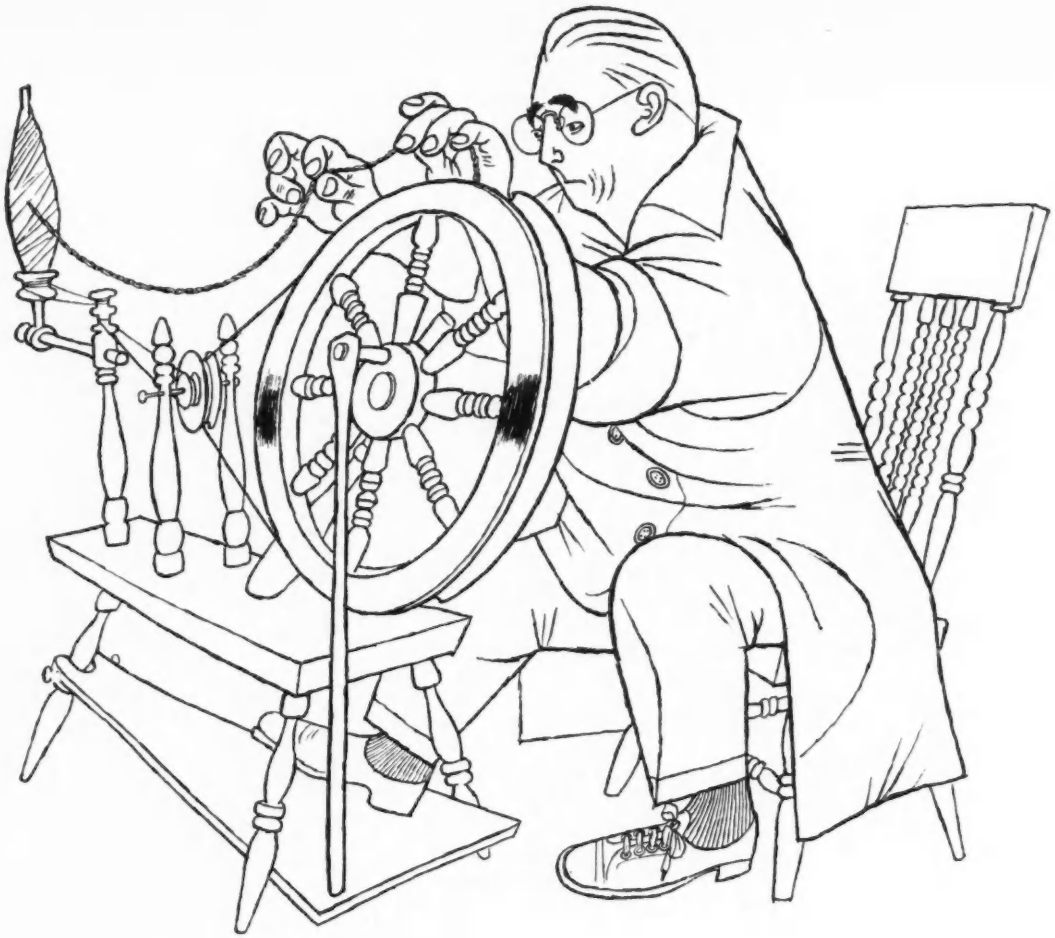
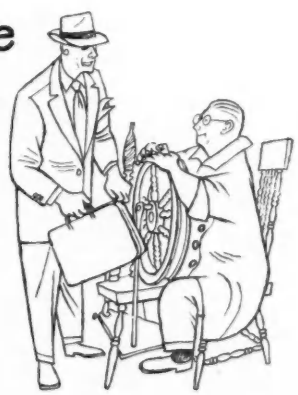
VAT DYES OF THE



If you make textiles...

(No matter how you make them, you need detergents.)

the Armour man is the man to see because he has more different soaps and synthetics than anybody!



(He's bound to have just the ones you need. Write him today.)

ARMOUR *Industrial Soap Division*

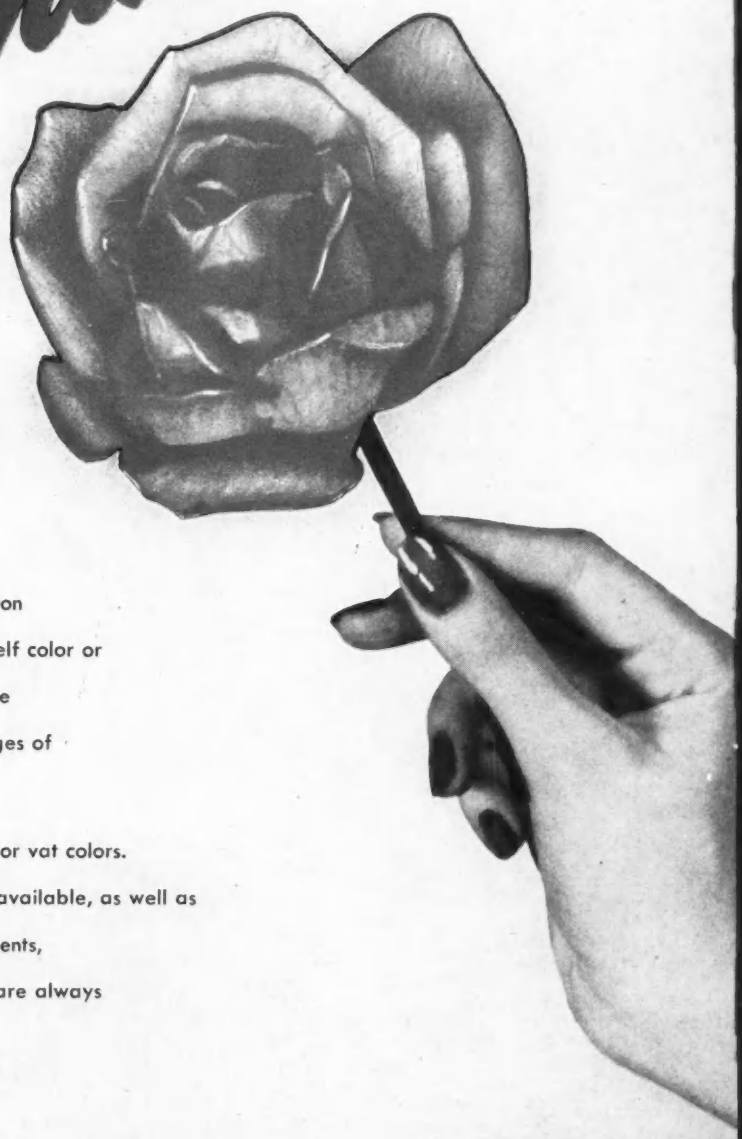
Armour and Company • 1355 West 31st Street • Chicago 9, Illinois

AMANTHRENE* VAT COLORS
provide the answer to the demand for
better color fastness in textiles

Amanthrene

PINK FF

in paste and
double powder form



A vat pink of distinction.
Its delicate brilliant shade tone is that
of fastidious ARISTOCRACY.

Without a peer for the printing of fine cotton
and rayon dress goods and draperies as a self color or
in combination. Equally suitable for dyeing the
same fibres. Offering the particular advantages of
both smooth paste and fine powder.

Another of the Amanthrene range of superior vat colors.
For detailed information on the whole range available, as well as
data regarding your own particular requirements,
consult our nearest branch. A.A.P. technicians are always
happy to be of service.

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TANK CAR or TANK WAGON LOTS

Eliminate costly handling charges

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Release live storage space

Details of inexpensive storage installations for your plant will be furnished without obligation. Write to our Engineering Department, today.

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how synergistic action of SANTOMERSE No. 1 and TSPP pays off after desizing

When you send goods to the kier after desizing, synergistic action of Santomerse No. 1 and Monsanto Tetrasodium Pyrophosphate gives you a bonus of extra detergency and extra economy. Synergistic action is the cooperation of the two Monsanto products to produce higher detergency than the average of the two used separately . . . higher than either used alone.

This synergism is effective in removing minerals, natural waxes and foreign matter and holding particles in suspension so they cannot settle back into fabrics. Complete rinsing is easy. Goods come out in perfect condition for succeeding processes.

You get economy in two ways. First, you save in price because TSPP costs even less than economical Santomerse No. 1, therefore synergistic action gives you more detergency at lower cost. Second, you'll find economy in the small amounts that you'll use. For example, excellent results in the kier come from using one-fourth of one per cent of Santomerse No. 1, one-fourth of one per cent of TSPP and 4 per cent of caustic soda (based on weight of goods).

For information and quotations on Santomerse No. 1 and TSPP, contact the nearest Monsanto Sales Office, mail the coupon or write: MONSANTO CHEMICAL COMPANY, Desk E, Phosphate Division, 1779 South Second Street, St. Louis 4, Missouri.

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

MONSANTO CHEMICALS

MONSANTO CHEMICAL COMPANY
Desk E, Phosphate Division
1779-E South Second Street, St. Louis 4, Missouri

Please send items checked: Data and quotations on _____Santomerse No. 1; _____TSPP.

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Company_____

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MONSANTO DETERGENTS AND WETTING AGENTS

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- Santomerse No. 3
- Santomerse No. 3 (Paste)
- Santomerse 30X
- Santomerse D
- Santomerse S
- Sterox* CD
- Sterox SE
- Sterox SK
- Sterox 5
- Sterox 6

*Reg. U. S. Pat. Off.

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minimizes | *splitting*

on Bemberg sheers

Photo courtesy of
AMERICAN BEMBERG CORPORATION

NEWS! Field reports are wildly enthusiastic—wherever AMBERTEX M is being used for printing Bemberg sheers and similar materials. It deposits a soft, pliable film on the cloth. Prints no longer embrittle, crack or rupture—as they do with ordinary thickeners.

AMBERTEX M is especially outstanding when used for white discharge, rapidogen and vat colors. There's no loss of color value. Instead, AMBERTEX M actually increases the color yield as much as 20%. It improves the quality of the color paste, produces smooth uniform blotches, and rinses readily in cold water.

AMBERTEX M is a grit-free, heavy-bodied printing thickener that enables textile printers to prepare vat pastes with tap water in one-half hour—instead of the 4 to 5 hours required by cook-up thickeners.

National also produces: CLEARFILM for sheer, lustrous finishes; FLOTEX to replace natural gums for printing; TABLE ADHESIVE for screen printing; FLOCK ADHESIVE 970 for chenille flock printing; HOOSIER PEARL CORN STARCH . . . THIN BOILING CORN STARCH . . . CHLORINATED CORN STARCH . . . and DEXTRINES.

Address: 270 Madison Ave., New York 16; Boston, Philadelphia, Atlanta, Indianapolis, Chicago, San Francisco, and other principal cities. *In Canada:* National Adhesives (Canada) Ltd., Toronto and Montreal.

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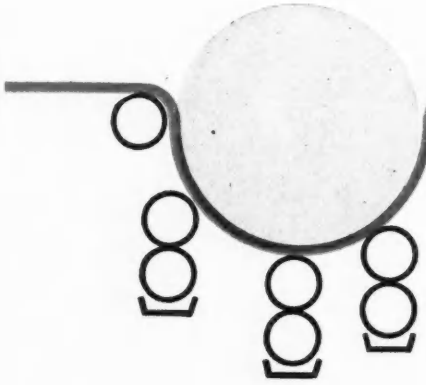
USE ARIDYE PIGMENT COLORS

BECAUSE THEY ARE . . .

FINAL IN SHADE

. . . THE LAST WORD IN ECONOMY



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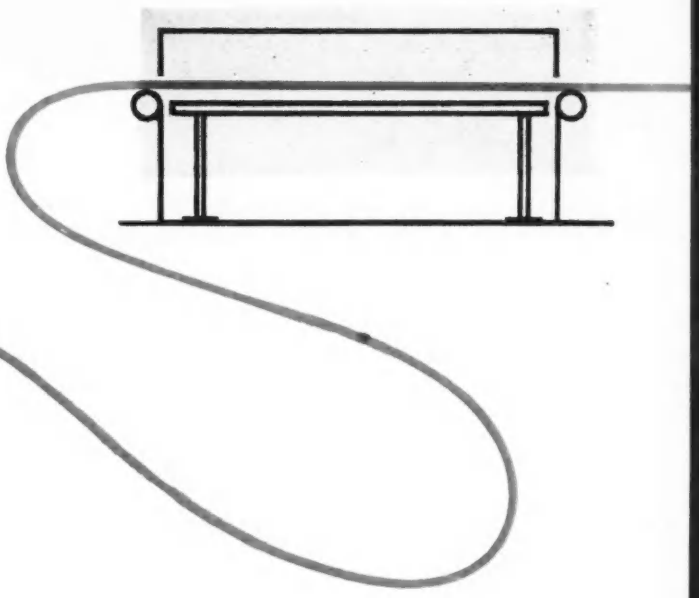

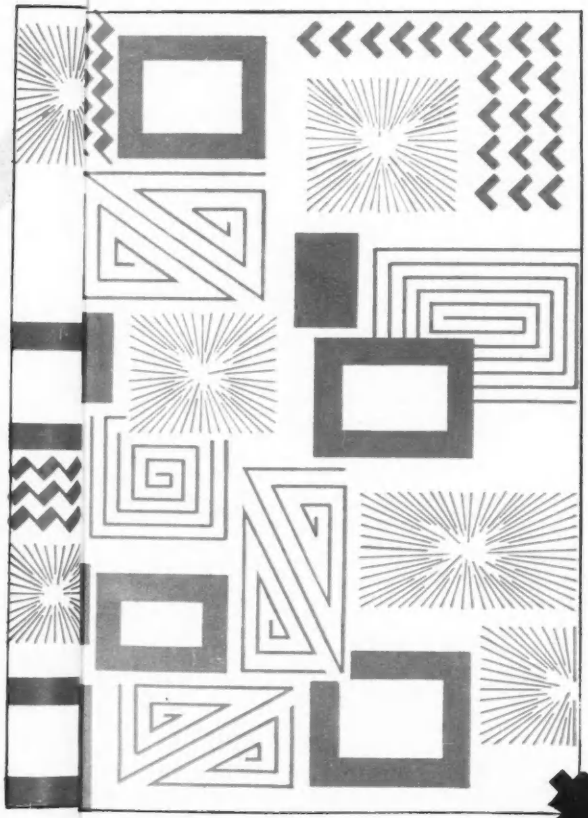

Final in shade . . . a minimum of costly seconds . . . that's why Aridye® Pigment Colors are the choice of printers who count their production pennies!

When shades are final as the fabric leaves the roller, printing defects can be detected and corrected immediately . . . yardage and money are saved. In addition, Aridye Pigment Colors eliminate 3 after treatment operations, thus saving time, steam, water, chemicals, and labor. They also effect savings in time and expense through quicker pitching or fitting of patterns.

An Interchem Technical Representative will be glad to discuss with you the many ways in which *you* can benefit from the use of Aridye Pigment Colors. Phone or write Interchemical Corporation, Textile Colors Division, P. O. Box 357, Fair Lawn, N. J.

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Textile Colors Division
FAIR LAWN, N. J. • ROCK HILL, S. C.
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Aridye *Pigment colors*

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TEXTILE CHEMICALS

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FINISHING MATERIALS

FOR

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THE BALANCED DETERGENT

Best value because it delivers the best combination of these desirable properties:

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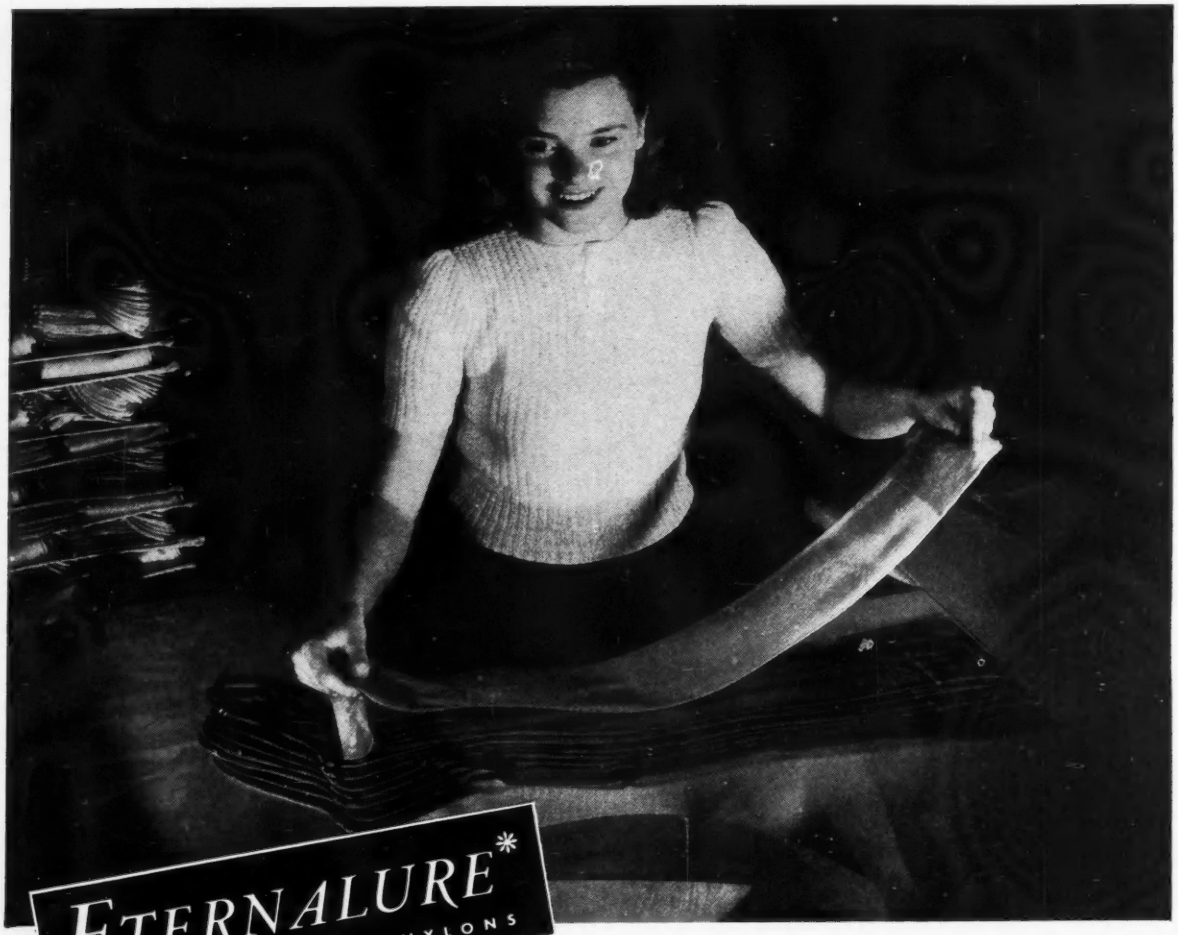

CUTS COSTS IN THE PLANT, TOO!

ETERNALURE-treated nylons sell better because, along with their daintiness and smoothness of fit, they offer exceptional snag resistance. They can be washed again, again and again, and the finish is still as good as new!

But don't overlook the plant advantages you get when you use Eternalure. Not only does it give you a well clarified stitch, but it gives a body to sheer hose that makes them easier to handle. You do not get as many menders, since there are fewer pull threads. You get the dullness you want without danger of chalky deposits due to uneven deposition.

Eternalure deserves a mill-scale tryout on *your* nylons, followed by a complete breakdown in the finishing department to prove its economies. Remember —there's no need for curing or heat treatments, and that no changes in operations or equipment are involved.

Investigate Eternalure Dull Finish!

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Brilliant colors . . . fast to light, laundering, chlorine and wear.

No other class of dyestuffs has the brilliance of shade and the range of colors combined with the unsurpassed fastness properties of Indanthrenes.

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TO DYERS AND PRINTERS:

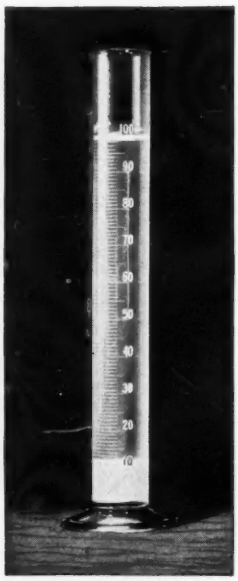
Have You Tested

LOMAR PW?

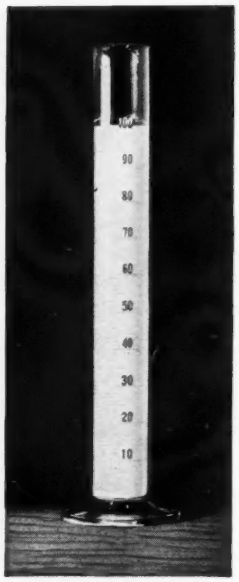
The new dispersing agent developed by Jacques Wolf & Company to insure more efficient and economical processing.

TYPICAL OF THE DISPERSING ACTION OF LOMAR PW

The contents of these two graduates are identical, except for a small percentage of LOMAR PW. Note the continued even suspension and dispersion in the right hand graduate after standing ten times as long as the one at the left.



Blanc Fixe after 30 minutes — no dispersing agent



Blanc Fixe after 5 hours — plus LOMAR PW

• *In Dyeing*

Level shades and uniform absorption of dyestuffs by the fibres, depend largely upon an even dispersion of colors in the dyebath. The addition of a small amount of LOMAR PW in pasting up indanthrenes or acetates solves this problem.

• *In Printing*

When added to the printing paste, LOMAR gives finer particle suspension, improved flow and smoother consistency. By keeping the colors in suspension, LOMAR PW assures efficient, economical results.

• *In Backfilling*

In backfilling, LOMAR PW is added to the heavy backfill mixture of clay and starches to give uniform suspension of the clay, good flowing properties and more uniform results on the fabric.

For complete information on LOMAR PW, send today for your copy of Bulletin No. 21.

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Plants: Passaic, Carlstadt, N. J.; Los Angeles, California

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JACQUES WOLF & CO.

Chemicals PASSAIC, N. J.

CALCO dyelines

No. 11 of a series

PUBLISHED BY AMERICAN Cyanamid COMPANY CALCO CHEMICAL DIVISION
Bound Brook, New Jersey
New York • Chicago • Boston • Philadelphia • Charlotte • Providence

A SUCCESS STORY: The Calco Copper Browns

Right from their first introduction, the Calco Copper Browns exceeded expectations by their superb performance. Available in three forms, Calcosol* Copper Brown Paste, Calcosol Copper Brown Printing Paste and Calcoloid* Copper Brown Double Powder offer the following advantages: (1) Very desirable *clear red-brown shade;* (2) Ability to act as a fast red shading element in vat color combinations; (3) Excellent fastness —especially fastness to *light* even in very light shades—which is unsurpassed by any other vat brown of similar shade. In addition, Calcosol Copper Brown Printing Paste is readily adaptable to printing very fast dusty roses and tans with pleasing tones.

Calcoloid Copper Brown Powder or Calcosol Copper Brown Paste are recommended for package yarn, raw stock, skein yarn and piece goods dyeing, cotton or viscose. For printing cotton and rayon, Calcosol Copper Brown Printing Paste is recommended.

*Trade-mark

Calconyl Blue Now Available in Two Forms

Stabilized azoic blues for cotton printing, in either the powder or solution form, are now available. Calconyl* Blue G Powder and Calconyl Blue G Single Solution produce clear, uniform blues with good fastness to washing, hot pressing, perspiration, dry cleaning and plissé. They offer fairly good fastness to light.

The Calconyl Blues augment the line of Calconyl Reds, Scarlets and Yellows now offered as powders or solutions. Try them in your next cotton printing pattern.

*Trade-mark

How to Lower Costs by Minimum Caustic and Hydro Usage

The use of minimum concentrations of caustic and hydro offers opportunity for economies in package dyeing. Fresh, undeteriorated hydro, approximately 92% $Na_2S_2O_4$, gives full money value in the dyebath, since the absence of the products of acidic decomposition permits savings in the caustic soda which would otherwise be expended for neutralization. And the absence of electrolytes, formed by reaction of caustic soda and the products of acidic decomposition, promotes level dyeing, as also does a low concentration of caustic and hydro in the dyebath.

Where equipment is well maintained, ¼ ounce of caustic and hydro per gallon is usually sufficient for light shades; ¼ to ½ ounce for medium, and frequently for dark shades. These quantities are usually specified for the pigment method operated at 180° F. —200° F.

Star Performers Among The Calco Naphthosols

There are about fifty known naphthols and over thirty known fast color bases suitable for textile mill use. Now, get your pencil out and figure how many combinations you can get, using a single naphthol with a single diazotized fast color base. Then add to this the additional combinations which can be made by mixing two or more naphthols, or two or more bases.

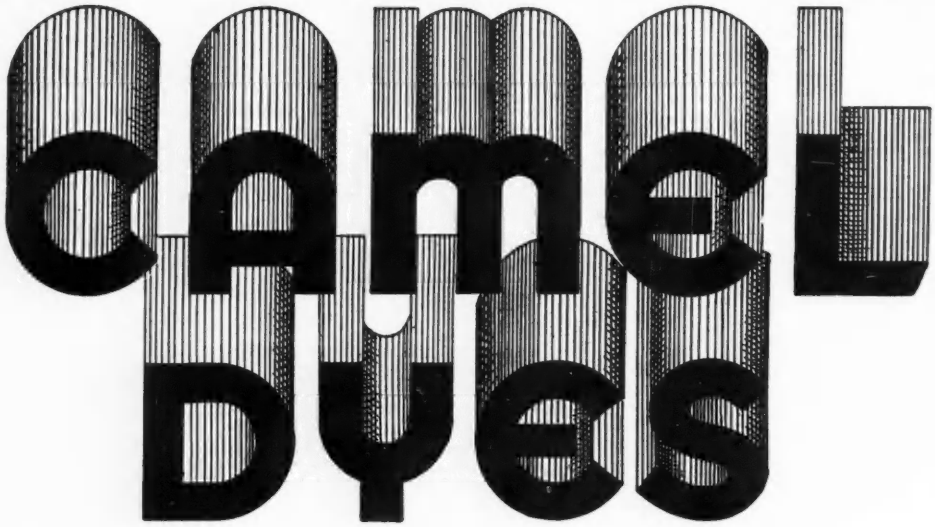
The result: thousands of shades with varying properties. Yet, comparatively few combinations are used very extensively because only these produce the desired shades and fastness, most economically and with greatest dependability. The following list contains some of the major products which are consistently popular in the trade.

Calco Naphthosol ASF Conc.; ASG; ASP; SWF; BO; BS; OL; D.

In addition, there are the Calco Naphthosol Fast Color Bases: Red KB Base; Red GL Base; Red GG Base; Red 3GL Base; Red B Base; Scarlet RC Base; Scarlet G Base; Bordeaux GP Base; Blue B Base.

Calco Naphthosols and Calco Naphthosol Fast Color Bases are highly recommended for dyeing or printing of cotton. Full bright shades of excellent fastness are most economically produced with these dyes.

Calco's daily electricity consumption equals that of a city of 45,000 homes.



THE CAMEL LINE OF
DEPENDABLE DYESTUFFS
has served the textile mills of America
without interruption since
1876.

This broad experience assures
PROMPT • EFFICIENT • ECONOMICAL SERVICE
TO MEET ALL DYESTUFF REQUIREMENTS

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MORE WORK IN LESS TIME

. . . when QUADRAFOS* eases scouring

Raw wool and piece goods speed through the scouring process faster than ever before when QUADRAFOS joins your soap and alkali. Emulsification of residual grease is quicker and more complete. Soil removal reaches new heights of efficiency. That's because QUADRAFOS gets under and between the soil and grease particles, lifts them off, forces them apart and holds them in perfect suspension for thorough rinsing . . . Write for proof of this and all the other time-saving, money-saving ways QUADRAFOS simplifies wet processing.

softens water without precipitation . . . deflocculates . . . redissolves precipitates . . . promotes free rinsing

*Reg. U. S. Pat. Off.

RUMFORD DIVISION, HEYDEN CHEMICAL CORP.
Technical Service Department
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Rumford 16, Rhode Island

Please send me further information about the use of QUADRAFOS in textile wet processing. I'm particularly interested in:

- ☐ Raw wool scouring
- ☐ Piece goods scouring
- ☐ Kier boiling
- ☐ Reducing bleach requirements
- ☐ Brighter, more uniform dyeing
- ☐ Viscosity control of printing pastes
- ☐ .....

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Firm .....

Address .....

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City ..... *Zone* ..... *State* .....

Take the Kinks Out

OF KIER BOILING WITH OLATE

No matter what type of cleaning agent you now are using in kier boiling, *you can do a better job with the help of Olate.* That's a bold claim, but it's backed by the successful experience many and many a mill has had with this pure, neutral, low titer soap.

Olate's emulsifying properties are outstanding. Cottons come out of the kier with a clean bottom which assures good bleaching and uniform dyeing.

MINIMIZES HARD WATER TROUBLES . . . If you're using hard water, you'll like Olate's performance. Olate forms finely dispersed hard water curds which are surprisingly free from any tendency to stick to the cloth and cause trouble in later operations. Niggerheads are minimized.

FASTER RINSING, TOO!

In cold rinses which usually follow kier boiling, Olate again shows its efficiency. This operation is fast and thorough—thanks to Olate's low titer.

A test run with Olate will demonstate its efficient performance, safety and economy. Why not place a trial order *now?*

PROCTER & GAMBLE CINCINNATI, OHIO

Olate *the universal textile soap*

lower de-sizing costs

RAPIDASE®

for Cottons, Rayons, Mixed Goods

An amylolytic enzyme preparation particularly adapted for faster, more economical de-sizing in any equipment. Its wide range of operation temperatures permits highest speed with most economical production. Its starch-solubilizing action is doubled with each 18° rise in temperature between 120° and 200° F.

higher quality work

SERIZYME®

for Acetates and Acetate-Rayon Mixtures

A proteolytic enzyme product that safeguards against streaky dyeing . . . Produces a finer hand . . . Assures uniform quality . . . Clearer cross dyes. SERIZYME liquefies protein and albuminous sizes and removes them completely.

Our technicians are available to visit your plant on request . . . Write for technical booklet.

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WIPE OUT STATIC

from Your Production Picture with NOPCO* 1656-R the antistatic oil that assures better WORSTED production

Today, when speeded-up processes in worsted yarn manufacture tend to promote static, you'll find Nopco 1656-R an ideal trouble killer.

Fibers treated with this specifically formulated oil remain static-free throughout carding, gilling, combing and drawing operations.

You'll avoid "wild" and broken ends, produce even-running, quality yarn with this new, antistatic lubricant.

Nopco 1656-R also ***eliminates*** oxidation, and ***reduces*** soap costs ***75%***. In fact, this remarkable new oil enables the worsted manufacturer to obtain exceptionally good results—comparable to those achieved by users of famous Nopco FUA oil for processing wool.

Yes, Nopco 1656-R means HIGH QUALITY WORSTED YARNS PRODUCED ECONOMICALLY . . . and in these competitive days what is of more importance to you?

Ask your Nopco representative for full details, or write today for complete information.

NOPCO TRADEMARK EVOLVED THRU RESEARCH

NOPCO CHEMICAL COMPANY

Formerly National Oil Products Company

HARRISON, NEW JERSEY

Branches: Boston • Chicago • Cedartown, Ga. Richmond, Calif.

* Reg. U. S. Pat. Off.

KELTEX ...The MODERN Algin Thickening Agent

GIVES COLOR-RICH COLOR-SHARP PRINTS

on acetate, viscose and pure silk dress goods, printed with acetate, acid and direct colors or with white discharge.

TOPS for TIES

printed with acid, direct and acetate colors—on acetate, viscose, wool and pure silk tie goods.

EXCELS for DRAPERY GOODS

printed with rapidogens, indigosols and fast-to-light direct colors on cotton, viscose and cupra rayon.

- *Exact and uniform printing paste viscosity*
- *Sharp, clean printing*
- *Maximum color penetration*
- *True, even color yield*
- *Easy and economical to use*
- *Readily soluble in cold water*
- *No cooking or special treatment*
- *Easily washed out after printing*

KELTEX...

A PRODUCT OF

KELCO COMPANY

KELTEX REFINED ALGIN PRODUCT

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MAYPON SUPER K
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USE . . .

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PROTEIN—FATTY ACID—CONDENSATION PRODUCT

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WE DON'T CARE

A HOOT IF IT'S...

TRITON X-100 scours them effectively and at low cost!

Write today for full details on TRITON X-100—as a dyeing and finishing assistant, for fast wetting and efficient scouring.

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

TRITON *is a trademark, Reg. U. S. Pat. Off. and in principal foreign countries.*

Improved
EMERY TWITCHELL OILS
for Cotton Finishing
...Regular and Sanforized Fabrics

To provide oils to meet varying finishing requirements, Emery manufactures three Twitchell Products. All of them are extremely stable, offering maximum resistance to oxidation, yellowing and rancidity. Won't corrode machines or metal parts; cause no gumminess or tackiness. *Most important,* treated fabrics retain rewetting properties indefinitely.

For FAST Rewet

Twitchell Oil 7250. All fatty-base oil imparting highest speed of wet-back. Gives soft hand . . . minimizes shade changes . . . enhances bloominess and color values. Minimum volatility, no tendency to "fog."

For MEDIUM SOFT Hand

Twitchell Oil 7240. A fatty-mineral base oil for medium soft hand is an efficient rewetting agent. Compounded to keep "fog" to a minimum.

For MINIMUM effect on Hand

Twitchell Oil 7231. All mineral base. Best where good wetting back, minimum effect on hand and greatest economy is sought. Compounded to keep "fog" to a minimum.

For REGULAR Finishing

Each of these three oils is recommended for regular finishing, for slashing, for increasing absorbency of towelling, wiping rags, paper maker's felts, etc. Twitchell 7210, 7211 and 7230 provide still lower cost oils for all types of cotton finishing where lower-quality, less-efficient assistants are adequate.

Our Sales Service Department is ready to schedule plant trials at your convenience.

OTHER EMERY PRODUCTS FOR TEXTILE PROCESSING

EMERSOL ELAINES

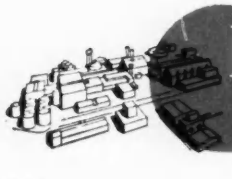
Current production of all Emery Oleic acids shows higher resistance to oxidation, better color stability, less tendency toward rancidity, greater odor stability, lowest unsaponifiable content of any commercial red oil.

EMERSOL STEARIC ACIDS

Manufactured to uniform quality standards . . . exceptional stability of odor and color (heat test) . . . unique qualities retained in most finished products.

ACIDS AND GLYCERIDES

Emery also manufactures: Animal, Cottonseed, Coconut, Soya Fatty Acids . . . Hydrogenated Acids and Glycerides.



EMERY INDUSTRIES, INC.

4300 CAREW TOWER · CINCINNATI 2, OHIO

EXPORT DEPT: 3035 R.C.A. BLDG., NEW YORK 20, N. Y.

Branch Office:
3002 Woolworth Bldg., New York 7, N.Y.
187 Perry St., Lowell, Mass.
401 N. Broad St., Philadelphia 8, Pa.

for plain or dischargeable dyeing of acetate fibers, fabrics, and blends

BLUE BGF

Eastone Blue BGF, a highly soluble azo dyestuff, dyes acetate medium-bright shades of blue which are highly resistant to atmospheric gas fading. It penetrates and levels at a somewhat lower temperature than azo blues previously offered, and has excellent build-up properties for both jig and box dyeing at temperatures which range from 180° F to the boil.

Eastone Blue BGF is one of the few blue acetate dyestuffs which are readily dischargeable. It has superior wash-fastness and resistance to dry cleaning, ironing, crocking, and perspiration. In cross-dyeing, it leaves viscose and cotton white. On combinations of acetate with silk and with wool, this dye produces bright shades of blue.

Eastone Blue BGF is one of an expanding line of Eastman Acetate Dyestuffs available in a wide color range for cellulose acetate fibers and fabrics. Complete information on the properties and uses of these dyestuffs may be obtained by writing to: Tennessee Eastman Corporation (Subsidiary of Eastman Kodak Company), Kingsport, Tennessee.

Eastman Acetate Dyestuffs

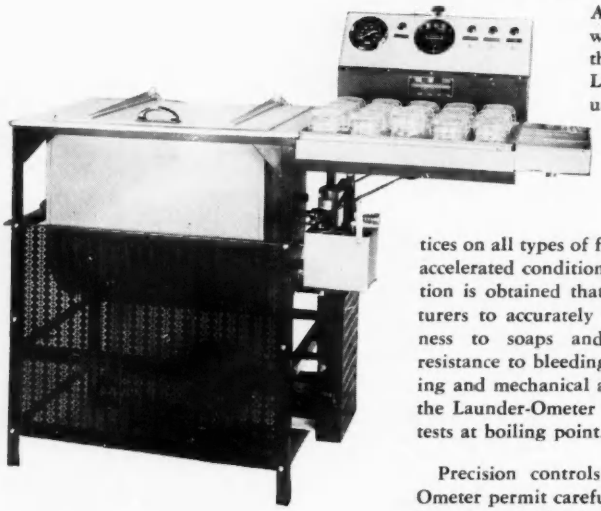
• Eastman Acetate Dyestuffs are sold in the United States through Tennessee Eastman Corporation in Kingsport, Tennessee, and Lodi, N. J.; in Canada, through Clough Dyestuff Company Ltd., 33 St. Mathieu Street, St. Laurent, Quebec.

ATLAS-OMETERS

for more than 25 years the textile industry's standard machines for testing

★ color fastness
★ shrinkage
★ detergency
★ bleeding
★ resistance to mechanical action, etc.

ATLAS LAUNDER-OMETERS



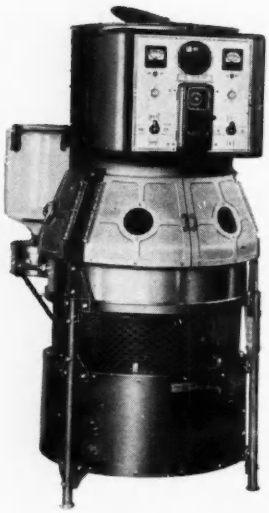
As the standard washing machine of the A.A.T.C.C., the Launder-Ometer is used to reproduce quickly the destructive effects of commercial laundering practices on all types of fabrics. Under these accelerated conditions, factual information is obtained that enables manufacturers to accurately predict color fastness to soaps and detergents, and resistance to bleeding, shrinking, washing and mechanical action. In addition, the Launder-Ometer is used for dyeing tests at boiling point.

Precision controls in the Launder-Ometer permit careful regulation of all factors, and identical reproduction of tests whenever desired. With its big capacity, the machine permits as many as 20 tests to be run simultaneously. The Atlas Pre-heating Loading Table—standard equipment on Launder-Ometers—makes it possible to start all tests at the same temperature, for greater accuracy. Mechanical action is provided by the introduction of stainless steel spheres or rubber balls into each container.

Located behind the Pre-heating Table, at the most convenient height is the modern control cabinet housing all switches, pilot lights, indicating and control instruments, and direct-reading dial type thermometer. Launder-Ometers are available for use with electricity, steam, gas, or both electricity and steam for heating the water bath. All machines are easily adapted to receive any type of container now under consideration by the A.A.T.C.C.

Two other Launder-Ometer models, specifically designed for research testing, are included in the Atlas line. These machines can accommodate larger samples and are available with container capacities from 20 pint to 6 half-gallon jars.

ATLAS FADE-OMETER



The Fade-Ometer brings under laboratory control the deteriorating action of sunlight on any material or type of finish. Used primarily to measure the light fastness of colors, the Fade-Ometer is also used to determine other photochemical changes caused by exposure to sunlight.

In making tests, samples in masked holders are rotated around an Atlas Carbon Arc—the closest approach to natural sunlight—at a fixed distance from the arc and at a constant speed in order to assure equal distribution of light to each sample. Upper and lower suspension rings keep samples in proper vertical alignment. Color fastness is measured in terms of Standard Fading Hours, using new calibration paper.

Operation of the Fade-Ometer is fully automatic. The simple, but complete control panel includes voltmeter, ammeter, running time meter, time switch, thermo-regulator, pilot lights and switches, which serve to keep all variable factors—time, temperature, humidity, and light—under accurate control.

The Fade-Ometer may safely be left in continuous operation overnight. It is available for either AC or DC service, and with a wide variety of sample holders and exposure masks.

Manufacturers of the Twin Arc and the XIA Weather-Ometers

ATLAS ELECTRIC DEVICES COMPANY 361 West Superior Street, Chicago 10, Illinois

AHCOVELS

put nature's softness in your fabrics

- **AHCOVELS** are permanently resistant to usual laundering and dry cleansing processes.
- **AHCOVELS** are stable under extreme heat.
- **AHCOVELS** are odorless and will not discolor.
- **AHCOVELS E, F, and R,** assure full retention of light fastness of any color.

There is a specific Ahcovel ***substantive softener*** to give cotton, wool and synthetic fabrics finer finishes, softer drape and hand . . . and with economy too. We will be glad to supply you with additional information or recommendations with regard to specific finishing problems on request.

ARNOLD, HOFFMAN & CO., INCORPORATED

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AHCOVELS

put nature's softness in your fabrics

- **AHCOVELS are permanently resistant to usual laundering and dry cleansing processes.**
- **AHCOVELS are stable under extreme heat.**
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- **AHCOVELS E. F. and R, assure full retention of light fastness of any color.**

There is a specific Ahcovel ***substantive softener*** to give cotton, wool and synthetic fabrics finer finishes, softer drape and hand . . . and with economy too. We will be glad to supply you with additional information or recommendations with regard to specific finishing problems on request.

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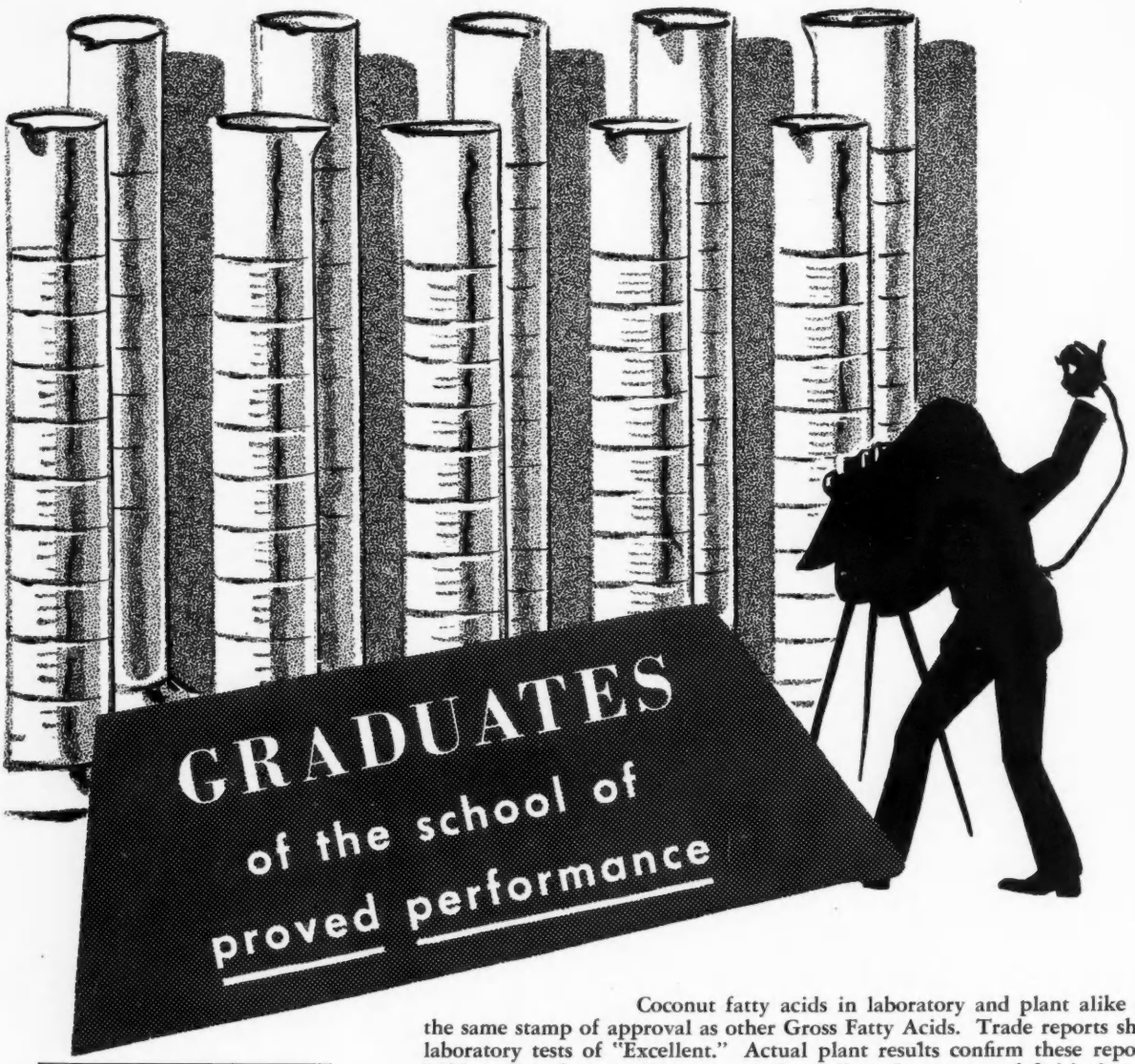

Coconut fatty acids in laboratory and plant alike get the same stamp of approval as other Gross Fatty Acids. Trade reports show laboratory tests of "Excellent." Actual plant results confirm these reports. White color, fast wetting power and excellent detergency of finished products assure customer acceptance in the textile field.

Gross Special Coconut Fatty Acids (with most of the Caprylic and Capric Acids removed) give detergent manufacturers a more desirable product.

RED OILS—Bland odor, low titre, light color. Produced entirely from selected animal fats. Improved chemical and physical properties due to modern distillation and control.

Manufacturers since 1837

A. GROSS PRODUCTS

Stearic Acid
Tallow Fatty Acids
Red Oil (Oleic)
White Oleine
Coconut Fatty Acids
Cottonseed Fatty Acids
Soya Fatty Acids
Saponification
Crude Glycerine
Stearine Pitch
Cottonseed Pitch
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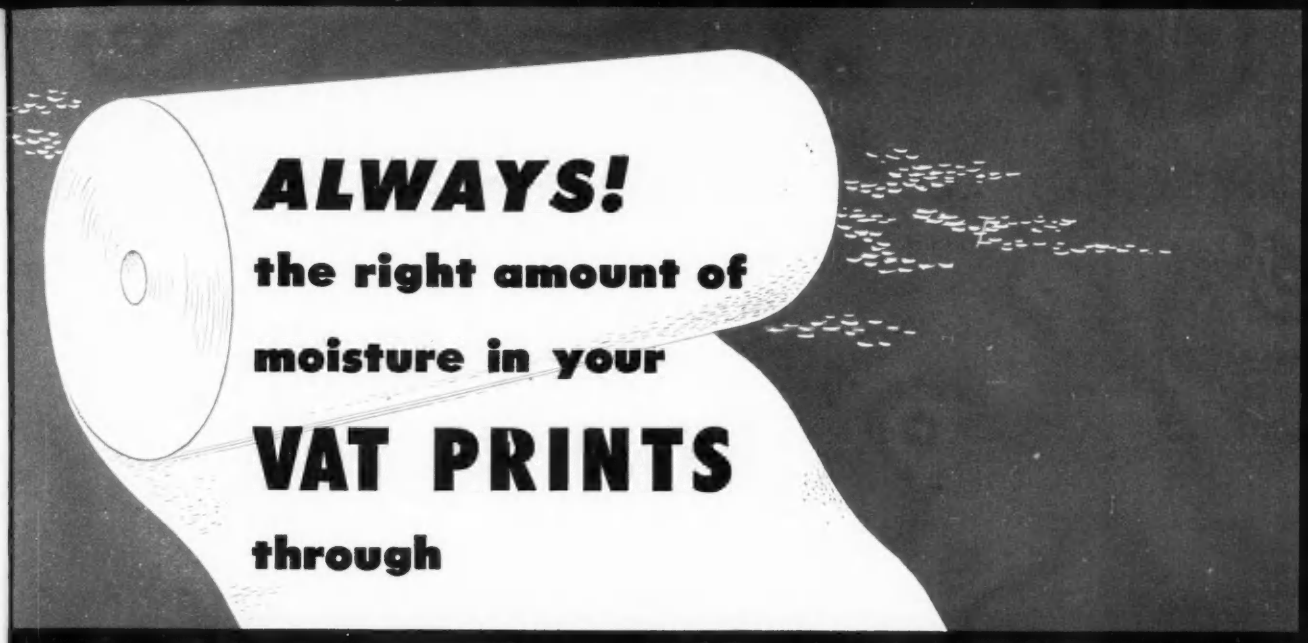
Toronto 3, Canada
Thompson Hayward Chemical Co.
Kansas City 8, Mo. (and branches)
James O. Meyers & Sons
Buffalo, New York



ALWAYS!

the right amount of moisture in your

VAT PRINTS

through

CORPOLIN®

HYGROSCOPIC AND PLASTICIZING AGENT

PROPERTIES . . .

CORPOLIN is a heavy non-volatile liquid—clear, colorless, odorless, free-flowing.

Resembles glycerin in feel and appearance.

A highly concentrated solution of organic compounds in water, containing 70% solids.

NON-TOXIC; NON-FLAMMABLE; no freezing point.

USES . . .

Attracts and retains the right amount of moisture in VAT PRINT PASTE. Replaces glycerin at ½ the cost, without change in formulation.

Introduces valuable economies through its power as a humectant.

Makes textile fabrics and paper flame-resistant.

Excellent for sizing, finishing and weighting.

Technical data sheet and samples forwarded on request.

THE AKTIVIN DIVISION

HEYDEN CHEMICAL CORPORATION

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HEYDEN CHEMICAL CORPORATION THE AKTIVIN DIVISION NEW YORK

HOSIERY SALES PREDICTION— CLEAR AND DULL

Unlike changing the weather, you can do something about guaranteeing yourself a production of salable hosiery with a clear, dull finish. Yes, no matter the denier you run, the hand you desire or the boarding method you use . . . Fanco finishes will seal in the beauty of your product . . . protect its loveliness from dye bath to consumer. Your Fanco fieldman will prove this with a no-obligation, on-the-spot test.

W. F. FANCOURT CO.
Philadelphia, Pa.
In the South, Howard A. Virkler, Greensboro, N. C.

SOLVING FINISHING PROBLEMS SINCE 1904

IT'S THE SPREAD THAT COUNTS

To the man in the duck blind, that needs no explanation.

He knows it's the shotgun's spread of fire that enables him to cover the area where the ducks are rising.

The *spread* that gives bleachers and dyers a wider operational range is just as important to their de-sizing operations as the spread of fire is to "good hunting." So many of them prefer the all-purpose de-sizing agent, Diastafor—Type L, because it works well in an unusually wide range of temperatures and pH, which meets all enzyme de-sizing requirements.

Probably no two lots coming to your mill are alike. There are always variables—in water or in sizing formulas—to be considered. Sometimes some unforeseen factor threatens to turn a job into a "problem lot." That's when Diastafor's "spread"—its flexibility—counts so much.

Diastafor—Type L is practically fool-proof in operation . . . it gives a fine, flawless finish under widely varying conditions.

Diastafor affords the same uniformly good results whether you are working with cottons, rayons, or mixed goods. You get the fine hand you look for in your finished goods. Diastafor helps keep dyeing even and unshaded, without streaks or blemishes. It can be used satisfactorily in the continuous process.

In addition to Type L, Diastafor de-sizing agents are available in a number of different forms. Diastafor's leadership for more than 40 years has been built on its ability to satisfy almost any de-sizing need.

We'll be happy to furnish further information and prices. Standard Brands Incorporated, *Diastafor Department*, 595 Madison Avenue, New York 22, N. Y.

INDIGOSOL* GOLDEN YELLOW IGK

. . . For Versatility

The present price of Indigosol Golden Yellow IGK makes possible the use of this very fast Indigosol for economical dyeing and printing operations. In combination with Indigosol Green IBA, very fast green shades are now available to the printer and dyer for the first time at a very reasonable cost.

An excellent printing color on cotton and rayon, it is also of great interest to the dyer of cotton, rayon and wool. In ease of application, the perfectly level shades obtained, and the unusually excellent penetration of heavy goods makes the entire line of INDIGOSOLS especially valuable to the fast color dyer or printer.

PHARMASOL* GOLDEN YELLOW N

. . . For Brightness & Economy

PHARMASOL Golden Yellow N produces clear, bright, fast and economical golden yellow shades when printed on cottons or rayons. When mixed with Pharmasol Red RN, a complete range of gold shades can be obtained.

PHARMASOLS are solutions of stabilized azoic dyes and adjusted to the most practical concentration which can be easily applied with a maximum of efficiency. PHARMASOLS solve the problem of troublesome dissolving and the uncertainties thereof — and as there is no decomposition there can be no loss of material or value.

Let Our Technical Staff Solve Your Problems

*Reg. U.S. Pat. Off.

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AMERICAN

DYESTUFF REPORTER

Incorporating Textile Colorist and Converter

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Official Publication of the Proceedings of the American Association of Textile Chemists and Colorists.

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Published every other Monday by the **HOWES PUBLISHING COMPANY, INC.**, One Madison Avenue, New York 10, N. Y. **C. R. Howes,** President; **Harry F. Crawford,** Executive Vice-President; **Norman A. Johnson,** Vice-President; **Ernest J. Finan,** Treasurer; **Myron D. Reeser,** Secretary; **C. Essenbreis,** Assistant Secretary.

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Also Publishers of
HOSIERY INDUSTRY WEEKLY
HOSIERY MERCHANDISING

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NOVEMBER 14, 1949
VOLUME 38 NUMBER 23

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O. W. Clark and H. R. McCleary

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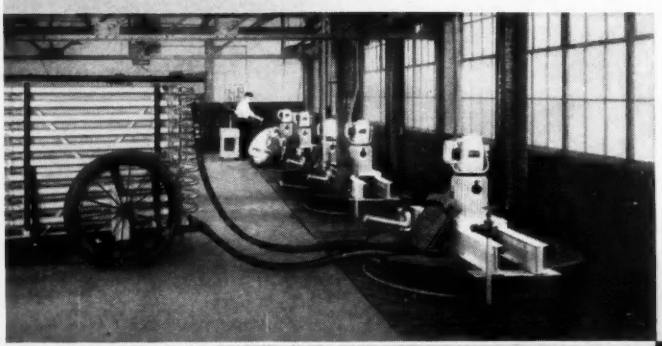
PYREX

eliminates the risk of contamination

Many metals contaminate the finest dyestuffs, causing spots on the finished fabric.

To *eliminate* this "risk", we've even gone so far as to build our own special apparatus of PYREX GLASS, such as the illustrated Heat Exchanger to replace ordinary metal equipment.



This unique, ultra modern PYREX Heat Exchanger is a portable piece of equipment through which is pumped the fluids to be heated or cooled.

In manufacturing, Althouse dyes never come in contact with corrosive metals while in the wet stage.

ALTHOUSE
Chemical Company, Inc.
READING · PA.

pace-setter in precision dye-making

Proceedings of the

American Association of Textile Chemists and Colorists

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November 14, 1949

CALENDAR

HUDSON-MOHAWK SECTION
Meeting: November 18.

NEW YORK SECTION
Meetings: November 18 (Swiss Chalet, Rochelle Park, N. J.) Jan. 13 (Hotel New Yorker, New York), Mar. 3 (Hotel Statler, New York), April 7, May 5 (Kohler's Swiss Chalet, Rochelle Park, N. J.), June 16—Outing.

NORTHERN NEW ENGLAND SECTION
Meeting: December 2 (Hotel Vendome, Boston).

PHILADELPHIA SECTION
Meeting: January 13 (Kugler's, Philadelphia).

RHODE ISLAND SECTION
Dinner meeting: November 18 (Johnson's Commodore Room, Allens Avenue, Providence, R. I.).

SOUTH CENTRAL SECTION
Meeting: November 19, (Hotel Patten, Chattanooga, Tenn.).

SOUTHEASTERN SECTION
Meeting: December 3 (At French Textile School, Georgia Institute of Technology).

WESTERN NEW ENGLAND SECTION
Meeting: December 9 (Danbury, Conn.).

COUNCIL
Meeting: January 13 (New Yorker, New York).

RESEARCH COMMITTEE
Meeting: January 13 (New Yorker, New York).

NATIONAL CONVENTIONS
1950: September 28 to 30, Portsmouth, N. H.
1951: October 18 to 20, Statler, New York
1952: Boston.

Committee Chairman Named for 1950 Convention

GEORGE H. WOOD, Apponaug Company, General Chairman for the 1950 National Convention to be held under the auspices of the Rhode Island Section, has announced the following chairmen of committees:

Assistant General Chairman—Raymond W. Jacoby, Ciba Company, Inc.

Dining and Banquet—Wilfred A. Lord, General Dyestuff Corporation, and Francis H. Casey, Sandoz Chemical Works, Inc.

Entertainment—E. Kenneth Bush, American Aniline Products, Inc.

Finance—Robert R. Farwell, E. I. du Pont de Nemours & Co., Inc.

Printing—Frank L. McCool, Sandoz Chemical Works, Inc.

Ladies—Robert P. Wood, Calco Chemical Division, American Cyanamid Company.

Exhibits—Raymond A. Pingree, Warwick Chemical Company Division, Sun Chemical Company.

Publicity—Dr. W. George Parks, Rhode Island State College.

Reservations—Herbert S. Travis, Rohm & Haas Company, Inc.

Registration and Reception—Thorwald Larson, Carbic Color & Chemical Co.

Technical Program—Alden D. Nute, American Cyanamid Company.

Transportation — Herman C. Allen, Sayles Finishing Plants.

The Convention will be held on September 28, 29 and 30 at Wentworth-by-the-Sea, Portsmouth, New Hampshire, and the committees are already at work in making the necessary arrangements.

The theme of the Convention will be "Advancement, Achievement, Through Continued Cooperation."

EMPLOYMENT REGISTER

This column is open for four insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information from the Secretary.

49-25

Education: High school, Lowell Evening Textile School, Northeastern University Evening.

Experience: Textile Chemist and Analyst.

Age 23; unmarried; references; Lawrence-Boston area preferred.

10-3, 10-17, 10-31, 11-14

49-15

Education: Equivalent of U. S. college, with some graduate work; also 5 months in U. S. A.

Experience: 9 years; since 1945 as dyeing master in mill of 900 employees specializing in wool.

Age 32; married; references; citizen of Denmark seeking position in North America, particularly southwest U.S.A.

10-3, 10-17, 10-31, 11-14

49-26

Education: Textile institute graduate, chemistry, dyeing and finishing.

Experience: Operations, administration and laboratory, quality control and product development.

Age 32; married; references; New England preferred.

10-17, 10-31, 11-14, 11-28

49-27

Education: B. S. in Chemical Engineering.

Experience: Research Chemist and Bleachery Foreman.

Age 35; married; references.

10-17, 10-31, 11-14, 11-28

EXHIBITS AT ATLANTIC CITY CONVENTION

We regret that the photos of the following exhibits were unsuitable for reproduction: Ellen H. Richards Institute, John Campbell and Company, Inc., Scholler Bros., Inc., Textile Bag and Specialties Co., and Philadelphia Textile Institute.

Macbeth . . .

Alco . . .

American Viscose . . .

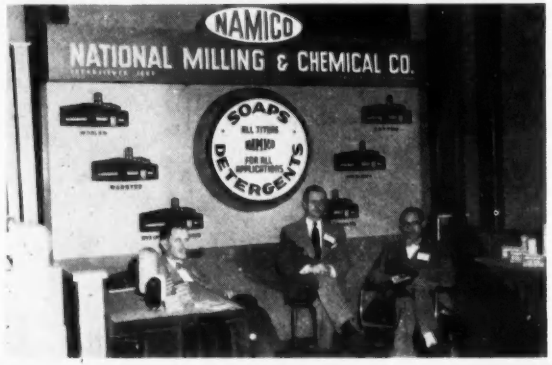
Hart Moisture Meters . . .

General Electric . . .

National Milling And Chemical . . .

Virginia Smelting . . .

Brabender . . .



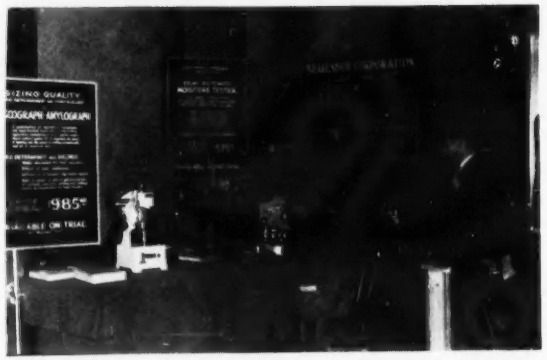
Calgon . . .

Rohm And Haas . . .

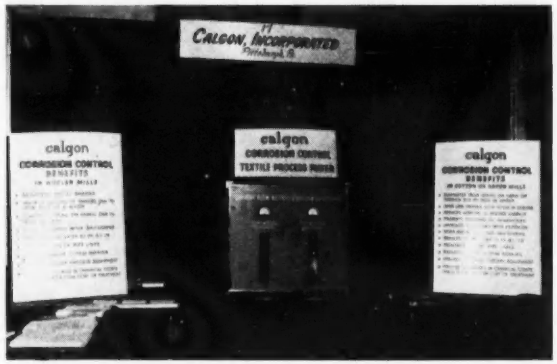
Brabender . . .

Calgon . . .

Rohm And Haas . . .



Monsanto Chemical . . .



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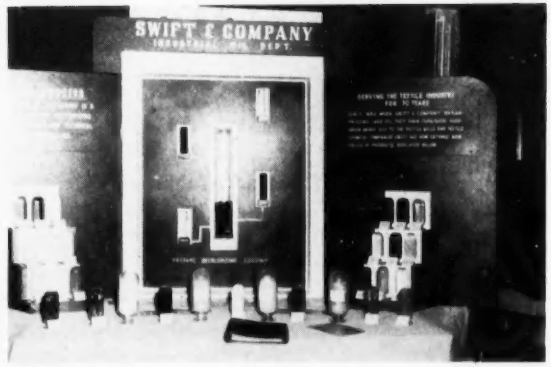

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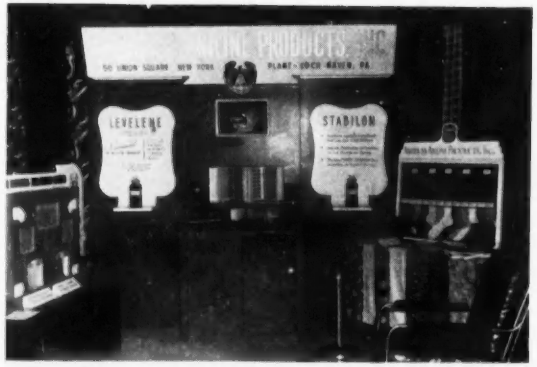

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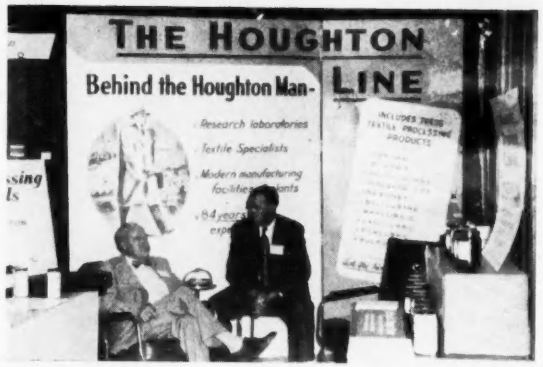

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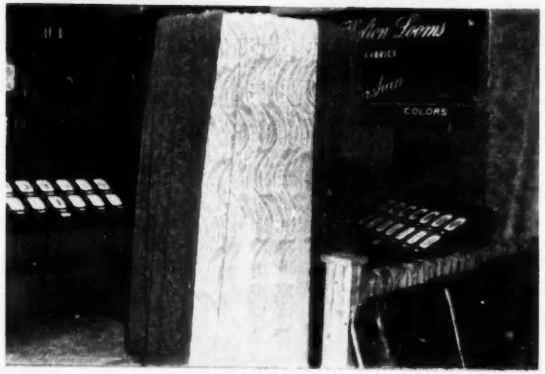

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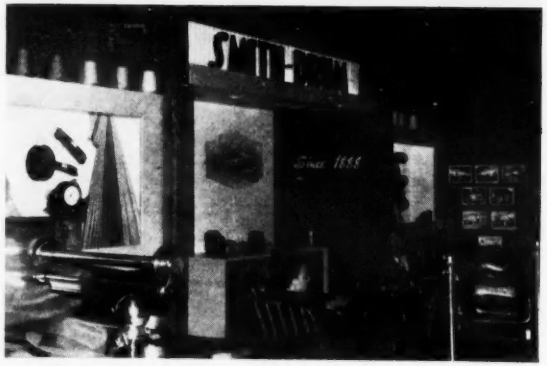

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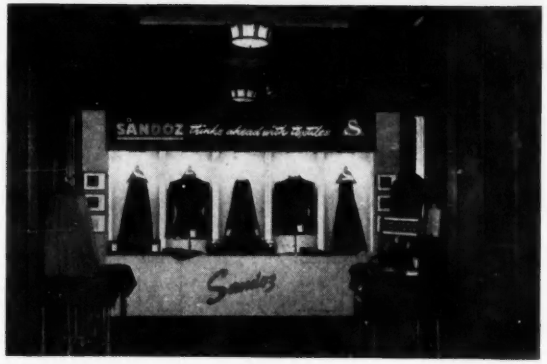

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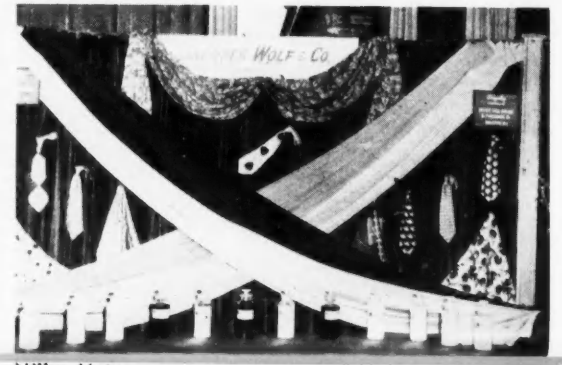

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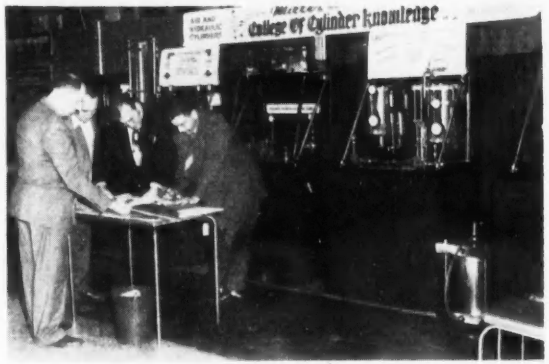
General Dyestuff . . .

Ebco . . .



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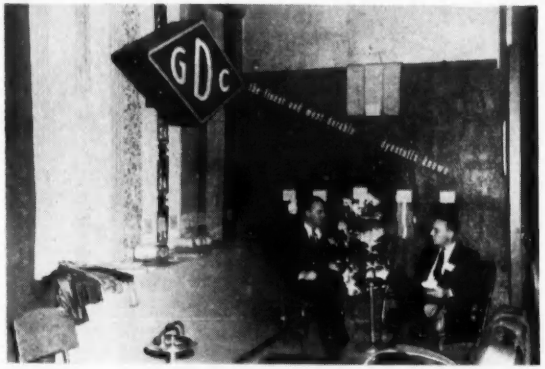

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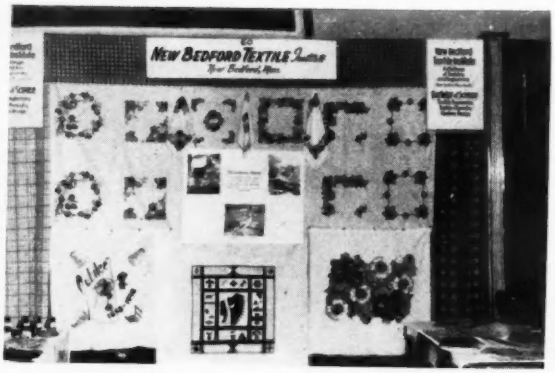

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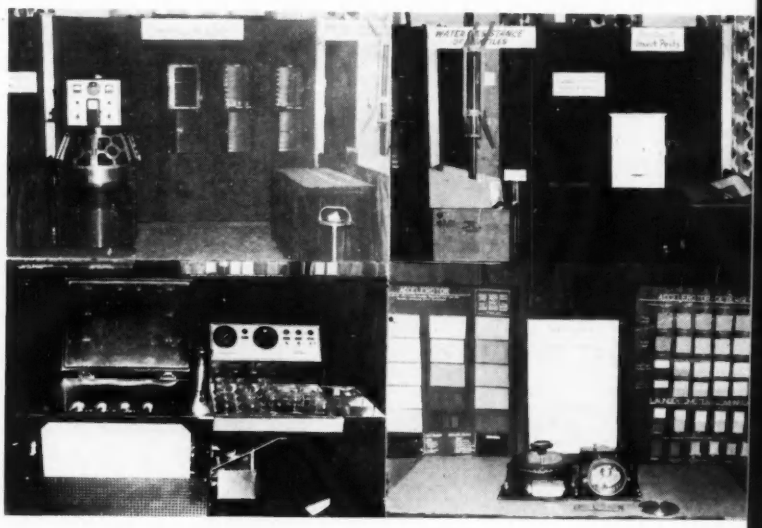

I.T.T. . . .

AWARD DINNER

Intersectional Contest—(2nd Prize Winner)

PRACTICAL TESTS FOR QUANTITATIVELY EVALUATING DYE CHARACTERISTICS AND DYEING METHODS*

Presented by the

NORTHERN NEW ENGLAND SECTION

Committee

John H. Skinkle, *Chairman and Speaker*
Leslie Christison
Jacob K. Frederick, Jr.
Ernest R. Kaswell
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Introduction

IN practical dyeing work, as well as in research work, it frequently becomes necessary to compare dyes with each other to determine which is suitable for a given use, or to determine which dyes could be used in a given mixture and be compatible with other dyes as to rate of dyeing. It also sometimes becomes necessary to compare one method of dyeing with another for a particular textile material, or to compare the effects of dyeing with and without a given assistant present in the dyebath, or the effects of different amounts of assistants. Similarly, the effect of various pretreatments of a fabric on its dyeing properties may be the immediate problem to be solved.

Previous Work

In practical work, the usual procedure has been to make the change in dyestuff used or method used, and then visually evaluate the finished dyeing in comparison with the standard dyeing. Insofar as simple intensity of shade is concerned, this may be done on a small sample and if unsatisfactory the sample may be discarded and another one made. As regards such properties as levelling however, a small sample will not give the information desired and it becomes necessary to dye whole lots of textile material which may turn out to be unsatisfactory and require discarding or re-dyeing.

In the field of research, both here and abroad, the tendency has been to develop methods and special apparatus which enable one to keep track of the amount of dyestuff in the dyebath at each instant, and from the plotted results, to make deductions as to how the dyestuff would behave in practical work; the use of the Dyeometer *(1)* is particularly suitable in this respect. In England, various workers *(2, 3)* have attempted to express mathematically the dyeing process and to express by constants the dyeing properties of the different dyestuffs. At present, the use of three values derived from the dyeing curve seem to be of most value:

1. Initial dyeing rate
2. Time of half dyeing
3. Final exhaustion

The initial dyeing rate is obtained from the slope of the dyeing curve at time zero and is known to the practical man as "strike". It is obviously the amount of dye which rushes onto the surface of the fiber at the instant it is immersed. This dye is not well penetrated, since diffusion into the interior is at a much slower rate than adsorption on the surface. The time of half dyeing is defined as that time interval at which the exhaustion of the dyebath reaches one-half of its final equilibrium value. It is generally considered a measure of the *average* rate of dyeing. The final exhaustion is the amount of dye which has finally left the dyebath when the dyeing is finished; if the time is sufficiently prolonged this value reaches an equilibrium. From these three values it is possible to deduce certain facts about a given dye or a given dyeing procedure. If the initial rate is high and the time of half-dyeing is low, then the dye is very likely to be non-level. Usually these values are also associated with a high final exhaustion. If the initial rate is low and the time of half-dyeing high the result will usually be quite level, but considerable dyestuff will be left in solution at the end of the process. Nothing about the dyeing curve directly measures the ability of the dye to penetrate although in many (but not all) cases penetration has been found to parallel levelling. It may also be noted that to obtain a good dyeing curve, particularly in the first stages of the dyeing, a very large number of individual colorimeter readings are necessary or some such highly specialized apparatus such as the Dyeometer, which records continuously, should be used.

Experimental Procedures

From the practical, as well as the research angle, it was thought desirable to measure directly the specific dyeing properties which govern the efficiency of the dyeing operation and the quality of the resulting dyed material, and it was decided that four determinations would give all the values necessary to predict the behavior of a dyestuff or dyeing process:

* Presented in Intersectional Contest, Atlantic City, October 14, 1949.

1. *Exhaustion* of the dyebath at the end of a commercially feasible time.
2. *"Strike"*, as measured by the color of the fibrous material at a short but definite time after contact with the dyebath.
3. *Penetration,* as measured by the color of the material a known and reproducible distance inward from the surface of the goods.
4. *Levelling* or ability of the dye to transfer from areas on the goods of high dyestuff concentration to areas of low concentration in a commercially feasible time interval.

The following are the methods finally decided upon for routine comparison of dyes, although it is one of the advantages of this procedure that the method, as well as the dye being investigated, may be varied. In the case of each procedure, a table of results obtained in a specific example studied is given and at the end of the paper a comparison of methods of dyeing and a comparison of dyes is made from the results of these four tests.

A. EXHAUSTION—A dyebath containing the assistants to be used and the correct amount of dye for the strength dyeing to be investigated (usually 1% on the weight of the goods) is made up. Part of the dyebath is reserved for use as a standard, and with the remainder a dyeing is made for the length of time being studied (usually one hour). This dyeing may be made on as large or as small a scale as desired and may even be made on a commercial machine. At the end of the dyeing, a sample of the dyebath is taken and cooled to room temperature. A comparison of the unknown dyebath with various known dilutions of the original dyebath is then made, preferably with a spectrophotometer, but also with sufficient accuracy by a photo-electric colorimeter or visual colorimeter; it may even be made by visual inspection in Nessler tubes. Taking the original dyebath as 0% exhaustion, and distilled water as 100% exhaustion, the result is expressed as percent exhaustion. As an example of the results obtained in a specific comparison, Figure 1 gives the calibration curve of the dyestuff solution and Table I gives the exhaustion of a typical milling type acid dye, Polar Brilliant Blue GAW (no *Colour Index* number), dyed in 1% strength on samples of a wool flannel which has been carbonized in several different ways.

It will be noted that the effect of using stronger acid for carbonizing is slightly to decrease dye exhaustion, resulting in a lighter shade. It will also be noted that

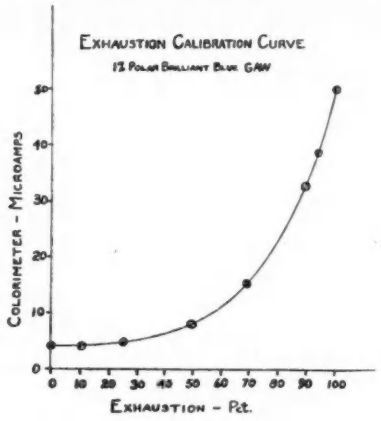


Fig. 1

neutralization of the goods after carbonizing lowers the exhaustion of the dye and also somewhat emphasizes differences in acid concentration in the carbonizing bath; that is, there is only 1% difference between the two, previous to neutralization, but 2% difference after the goods are neutralized.

B. STRIKE—A dyebath containing the correct amount of dye and assistants for the conditions to be tested is made up; the scale of the dyeing may be as large as desired. The sample is entered into the dyebath in two pieces simultaneously—the large bulk of sample in one piece, and a smaller piece usually one tenth of the total weight of sample, but at least large enough in area to be measured by the spectrophotometer or colorimeter used. The small sample is removed after exactly one minute and the large sample after one hour. Each sample is rinsed and dried. Using the recording spectrophotometer, a curve of the undyed material, the one minute sample, and the one hour sample are run on the same sheet of paper. A typical set of curves is given in Figure 2. If a spectrophotometer is not available, a filter type colorimeter such as the Hunter or the Photovolt may be used, in which case all three filters are used. If the spectrophotometer is used the area under each curve is integrated either mechanically by a planimeter or by taking readings every 20 millimicrons and adding; in the case of the colorimeter, the values obtained with the three filters are added together. If we let

R_0 = total color reflectance on the undyed sample,

R_1 = total color reflectance on the one minute sample, and

R_{60} = total color reflectance on the one hour sample,

then the color absorbed by the dye on the one minute sample is $R_0 - R_1$ and the color absorbed by the one hour sample is $R_0 - R_{60}$. If we define the "strike" (S) as the color (not dyestuff) on the one minute sample expressed as percent of the color on the one hour sample, then

$$S = \frac{R_0 - R_1}{R_0 - R_{60}} \times 100$$

Table II gives a comparison of the "strike" obtained on a wool flannel with a 1% dyeing of Fast Wool Blue R (Colour Index #208) with no acid, acetic acid, and sulfuric acid.

TABLE I
Exhaustion of a Milling Type Acid Dye (Polar Brilliant Blue GAW)

	Exhaustion
Uncarbonized	76%
Carbonized in 4% acid	100
Carbonized in 8% acid	99
Carbonized in 4% acid, neutralized	96
Carbonized in 8% acid, neutralized	94

TABLE II
"Strike" of an Acid Dye (Fast Wool Blue R)

Acid Present	*Strike*
None	38%
2% acetic acid	87
2% sulfuric acid	98

It will be noted that any acid increases the "strike" but that the more highly ionized mineral acid is much the highest. It should be noted and remembered that the figures given refer to *color* and not to *weight* of dyestuff. In the short period of one minute, only the surface of the goods or fibers is dyed. If concentration of dye instead of color is desired, then the logarithm of the reciprocals of the reflectances should be used.

C. PENETRATION—A dyebath of the correct dye and assistant strength is prepared. The sample consists of a number of squares of the wool fabric being tested of any size larger than two inches square. An odd number of these squares (usually 5, 7, or 9) is sewn together around the edges to make a pad of a known number of layers. The pad is dyed by the procedure being tested and the sample is then rinsed and dried. A piece of the original undyed fabric, a piece of the surface layer of fabric, and piece of the middle layer of the pad are then measured for reflectance in the same manner as for strike; the integrated reflectances are also obtained in the same manner. If

R_0 = total reflectance on the undyed sample,

R_s = total reflectance on the surface square of the pad,

R_m = total reflectance on the middle square of the pad, and

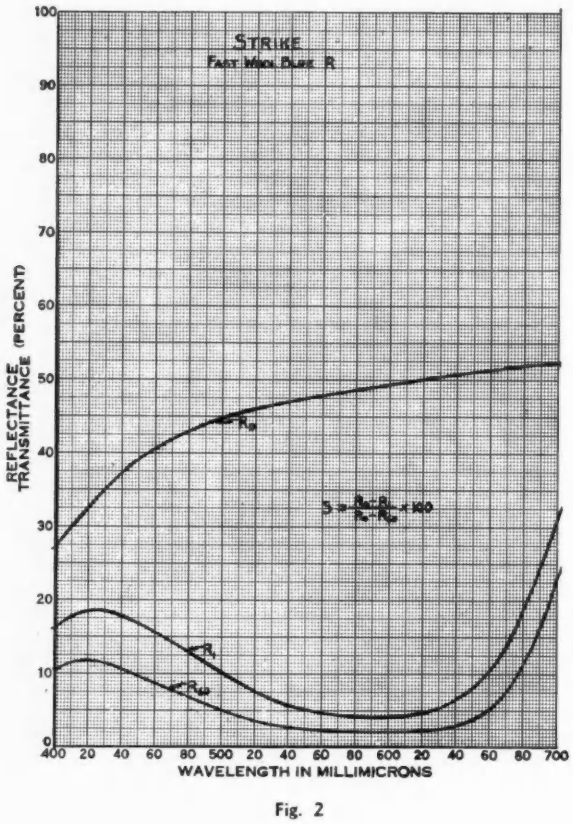


Fig. 2

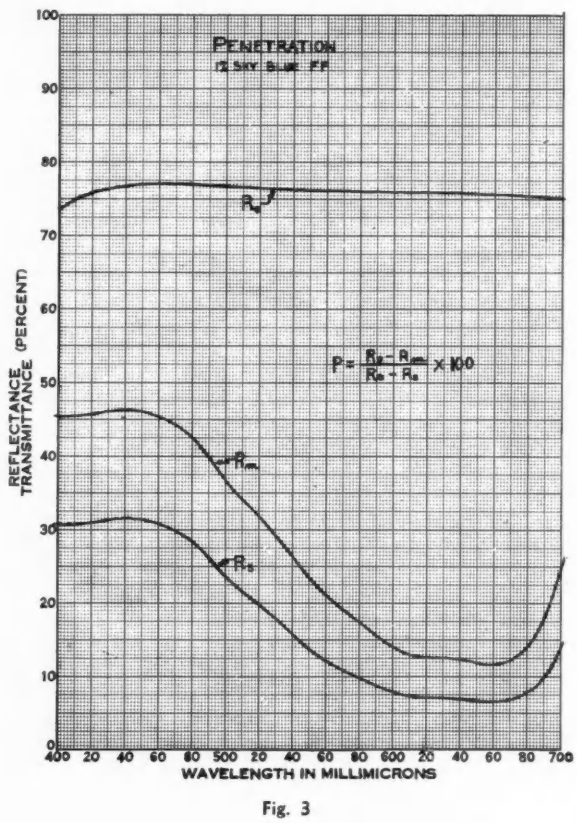


Fig. 3

P = penetration expressed as color reflected by the dye on middle square divided by the color reflected on the surface square, and multiplied by 100, then

$$P = \frac{R_o - R_m}{R_o - R_s} \times 100$$

Figure 3 shows the spectrophotometer curves for one dyeing and Table III gives the penetration results obtained by using two different direct cotton dyes—Sky Blue FF (Colour Index #518) and Diphenyl Fast Blue Green BL (no Colour Index number)—at two different temperatures. It should be noted again that the figures refer to *color* and not to *weight* of dyestuff. Of thees two dyes, the Sky Blue was known to be colloidal at low temperatures but to approach true solution at the boil; the Diphenyl Fast Blue Green was known to be in nearly true solution at all temperatures. The penetration results are in line with this knowledge.

TABLE III
Penetration of Two Direct Dyes at Two Temperatures

Destuff	*Penetration at:* 60°C.	Boil
Sky Blue FF	85%	95%
Diphenyl Fast Blue Green BL	97	99

It will be noted that both dyes have a high penetration at the boil where both are in the form of single molecules, but that Blue-Green is also high in penetration at the lower temperature whereas the Sky Blue decreases in penetration at the lower temperature where the particle size is considerably larger.

D. LEVELLING—A sample of the fabric is dyed in 1½% strength with the dyestuff to be tested by any convenient method, rinsed, and dried. A dyebath containing all the assistants but excluding the dyestuff is then prepared. A given weight of the 1½% dyed fabric plus half as much undyed fabric is immersed in the blank dyebath at the required temperature and for the required time. This gives us a dyebath in which everything is at normal conditions except that at the start two-thirds of the sample is heavily dyed and one-third is completely undyed. If the dyestuff were completely levelling at the conditions used, then the final two samples should be exactly alike. If, on the other hand, the dyestuff had absolutely no levelling ability, then the two samples should remain as they were when entered. After the "dyeing" is completed, the samples are rinsed and dried and are then run on the spectrophotometer or colorimeter as in preceding tests; a sample of the original dyed as well as original undyed samples are also run (Figure 4 shows a typical set of curves). Then, if

R_o = total reflectance on the original undyed sample,

R_o' = total reflectance on the original undyed sample after the levelling procedure,

R_d = total reflectance on the original dyed sample,

R_d' = total reflectance on the original dyed sample after the levelling procedure, and

L = percent levelling accomplished,

obviously the original unlevelness of color existing when the samples entered the bath is $R_o—R_d$, and the unlevelness still remaining at the end of the "dyeing" is $R_o'—R_d'$, then the levelling which was accomplished during the "dyeing" is $R_o—R_d)—(R_o'—R_d')$

$$\text{and } L = \frac{(R_o—R_d)—(R_o'—R_d')}{R_o—R_d} \times 100$$

TABLE IV
Levelling of a Vat Dye, Dyed by Reduced Vat Method (Jade Green N)

Levelling Agent	*Levelling*
0%	56%
0.5	66
1.0	68
2.0	67
4.0	57

Table IV shows the effect of adding a certain commercial levelling agent to the dyebath in the case of a vat dye, Jade Green N (*Colour Index* No. 1101), dyed by a standard reduced vat method.

As may be seen from the table, the addition of this levelling agent in any amount from 0.5% to 2% appreciably improves the levelling of the dyestuff when this method of application is used. The slight maximum at 1.0% based on this test alone, is probably not significant, although other tests not shown here confirmed that this concentration was the optimum one.

Application of the Tests

The above four tests have been used to make comparisons of processes and dyes; where possible, these comparisons have been made in cases where practical experience or the work of other investigators have established a standard of comparison. Two such instances will be reported and may be considered as typical.

Fast Wool Blue R (Colour Index No. 208) is rated in the *Colour Index*, and also by experienced dyers, as an acid dye which should be dyed by the ammonium acetate method for completely satisfactory results, although it may be dyed by the acetic acid method in many cases. Dyeing by the sulfuric acid method is known to give completely unsatisfactory results. Samples were dyed by all three methods using the same times, temperatures, and dye concentrations and varying only the assistants used. The results are shown in Table V and the reasons for the behavior of the dye are explainable from the figures of Table V.

TABLE V
Comparison of Methods of Dyeing An Acid Dye (Fast Wool Blue R)

	Methods used: 2% *Sulfuric acid* 15% *Glaubers salt*	2% *Acetic acid* 15% *Glaubers salt*	3% *Ammonium acetate* 15% *Glaubers salt*
Exhaustion	100%	99%	50%
"Strike"	98	87	48
Penetration	83	95	98
Levelling	62	76	95

TABLE VI
Comparison of Two Direct Cotton Dyes

	Dyes used: *Diphenyl Sky Blue FF*	*Diphenyl Fast Blue Green BL*
Time of half-dyeing-min.	*15.9 (Rapid dyeing)*	*159.2 (Slow Dyeing)*
Exhaustion	50%	33%
"Strike"	84	72
Penetration	95	99
Levelling	96	91

It may be seen that the exhaustions by the two acid methods are complete or nearly so, but that the exhaustion by the ammonium acetate method is only 50%. This, of course, is in favor of the use of acid. The penetration by the sulfuric acid method is only 83% as compared with over 90% for the other two methods. The levelling by the ammonium acetate method is 95%, by the sulfuric acid method only 62%, and the acetic acid method is intermediate but nearer the sulfuric acid method. The reason for the levelling results is shown by the "strike" figures where the sulfuric acid shows a quick rush of the dyestuff onto the surface, the acetic acid a little slower, and the ammonium acetate very much slower. The ammonium acetate method therefore gives the dyestuff time to penetrate the fabric and distribute itself uniformly throughout the fabric before deposition. The ammonium acetate method therefore could be expected to give poor exhaustion but excellent penetration and levelling; the sulfuric acid method would be economical as regards use of dyestuff, since exhaustion is complete, but a poor quality dyeing would result. The acetic acid method gives nearly as good exhaustion as the sulfuric acid method and nearly as good penetration as the ammonium acetate method; its levelling, however, is rather poor because of its high "strike." If some way of decreasing the "strike" could be found, then the levelling should increase and the acetic acid method should be almost as good as

(Concluded on Page P827)

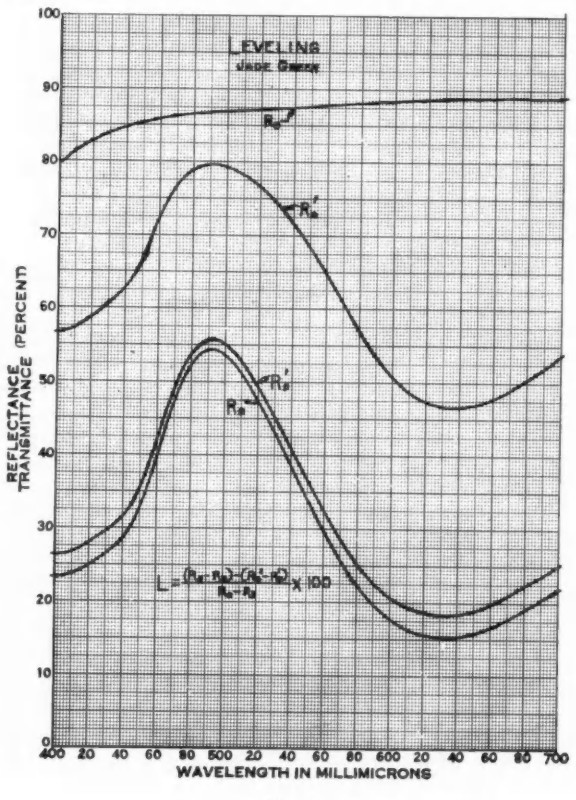


Fig. 4

Intersectional Contest—(3rd Prize Winner)

DYEING MIXED ACETATE AND VISCOSE FABRICS WITH VAT COLORS*

PIEDMONT SECTION

Committee

C. B. Ordway, *Chairman*
R. A. Bruce
J. N. Grant
V. B. Holland
Clarence Hooper
J. T. Jennings
H. J. Jordan, Jr.
L. C. Reynolds
S. H. Williams
Joseph Lindsay, Jr., *Speaker*

THE purpose of this study was to investigate the possibility of dyeing union shades with vat dyes on fabrics manufactured from mixtures of acetate and viscose without the use of swelling agents and with little or no saponification of the acetate.

The importance of this problem has long been recognized because of the large yardage of fabrics on the market made from varying combinations of the above fibers, and the difficulty of securing the desired fastness on such goods without the use of vat colors.

In applying these colors to this type of goods, two general methods have commonly been in use. These are:

1. Swelling the acetate with organic agents such as the alcohols.
2. Saponifying the acetate either before dyeing or in the dyeing step itself.

Both of these methods are capable of producing unions between acetate and viscose, but both have some features which make control rather difficult under many conditions.

In searching for a new approach to this problem, a great many substances were experimented with, using a variety of procedures. As these experiments progressed, one product stood out in its effect on the take-up of vat dyes by acetate fibers. This was tannic acid, a very old friend of the textile chemist in connection with other fibers and other dyestuff classes. Our preliminary tests showed that after acetate had been treated with this acid, it would take up a much greater quantity of reduced vat dye than untreated material dyed under the same conditions. The greater the concentration of tannic acid the greater was the color pick-up within reasonable limits.

Following up this discovery of the influence of the above compound on the dyeing of acetate, many other acids were tested for similar results. Among these were the ordinary mineral acids at concentrations less than necessary for the swelling of acetate, and organic acids such as acetic, formic, tartaric, citric, gluconic and gallic. Of this group, only the last named, gallic, gave results approximating that of tannic. Because of the close chemical relationship between gallic and tannic acids, these preliminary tests pointed out that the increase in affinity of the acetate, after treatment with these substances, was caused by attraction of these substances for the dye rather than a simple lowering of pH from the acid nature of the substances as was first thought.

Because of this line of reasoning, it was logical to next investigate the behavior of the products which have been used as substitutes for tannin bodies for many years in the textile and other branches of industry. In this group the phenol-sulfur condensates, commonly sold as Katanols, Thiotans, etc., were found to increase the dye pick-up of the acetate in much the same way as the tannic and gallic acids. These phenol compounds appear to have a definite affinity for the acetate and were effective for the purpose under study in much smaller concentrations than the above acids.

Having in mind the general information, that it was possible to increase the depth of color on acetate by the use of substances of the above two types, the problem was outlined to determine, as far as possible, the most effective conditions for using these compounds for the purpose in mind, and the results as far as the fibers themselves were concerned after they had been dyed under these conditions. The work was therefore divided into the following sub-problems:

1. The use of the phenol-sulfur condensates.
2. The use of tannic acid.
3. The use of mixtures of the phenol derivatives with tannic acid.

In studying the details of application the phenol substances were investigated first since they had shown themselves to be the most effective in the preliminary tests. Two different forms of these compounds have been in use for many years. Normally one type is preferred as a mordant for basic dyes and is sold as Katanol

* Presented in Intersectional Contest, Atlantic City Convention, October 14, 1949.

O (U. S. Patent 1,450,463), Thiotan MS, etc., while the other type is used as a resist for wool in mixed fiber dyeing. This second form is sold under such names as Katanol W (U. S. Patent 1,600,525) Thiotan RS, etc.

Upon application to goods containing cellulose acetate, it was found that the first type saponified the acetate to a marked degree under the comparatively high temperatures necessary for satisfactory dyeing. This was to be expected since this type is rather strongly alkaline and is difficult to neutralize without decomposition.

The type used as a wool resist, however, being practically neutral, did not saponify the acetate even after comparatively long periods of treatment at temperatures close to the boil. These products are stabilized and solubilized modifications of the older alkaline phenol-sulfur compounds, and remain in solution over a fairly wide pH range on both the acid and the alkaline sides. In the matter of improving the yield of vat dyes on acetate fibers, the above named Katanol W proved the best of the products experimented with in this group.

Continuous Method of Dyeing Necessary

In considering the factors involved in the application of vat dyes, and the effect on any acetate that might be present in the goods being handled, it was evident that conditions must be set up which would tend to minimize the tendency of the acetate to saponify in the alkaline dye bath. It has been well established that the principal factors influencing saponification of the acetate fibers in such dye baths are:

1. Temperature.
2. Concentration of alkali.
3. Time of contact between the fibers and the alkaline solution.

With reference to the question of temperature, all preliminary tests had indicated that temperatures of 140°F. and above were necessary to give satisfactory color pick-up by the acetate under the conditions used. This of course is a well-established requirement when applying other classes of dyes to this fiber. The vat dyes as a class require comparatively strong solutions of alkali for their proper reduction and application, and most of them suffer in shade and fastness if sufficient alkali is not present for their individual requirements. With the minimum of alkali definitely set in a rather narrow range, and the optimum of temperature being high, the factor of time of contact appeared limited to a very short period. This meant then that some type of continuous system, where time may be short, would afford the best possibility of controlling the actual dyeing step regardless of the methods used for other necessary treatments. The two principal continuous processes, the pigment-pad and the reduced methods, both were therefore employed in studying the details of behavior of the various products on acetate in conjunction with the vat dyes.

Laboratory Apparatus Used in the Experiments

The apparatus used in all the laboratory experiments consisted of a small, stainless steel dye unit of the type described and illustrated by C. L. Zimmerman in Calco's *Technical Bulletin* No. .793. This unit was designed chiefly for the study of continuous application of colors to various fabrics, and for the work in question the dye box was placed in line with a light, rubber-rolled wringer. The rollers were motor driven so that the time of immersion could be held constant.

Katanol by the Pigment-Pad Process

Since this phenol derivative had offered the most promise in regard to increasing the color take-up by acetate of all the substances tried, effort was first concentrated on this product. In trials of this compound by the pigment-pad method, the dissolved Katanol was added to the unreduced vat color diluted with water at 185°-190°F. Swatches of the fabric were passed through this solution in the dye unit and dried. After drying, reduction was carried out on the unit at temperatures varying from 140°-195°F. The cloth was immediately dipped into dilute acetic acid (as a saponification control), oxidized with perborate, soaped with synthetic detergent and rinsed in warm water before the final drying.

By this procedure there was a definite increase in depth of color on the acetate as compared to that in a similar swatch treated in the same manner except that no Katanaol was included in the treatment. With none of the dyes used however was there enough color picked up by the acetate to give a satisfactory union with the viscose unless high enough concentrations of caustic were employed to give objectionable saponification. Increasing the concentration of Katanol up to its limit of solubility, approximately 8 ounces per gallon, did little to further increase the color pick-up of the acetate under the above conditions.

Katanol W by the Reduced Method

In the preceding tests with this compound, time of treatment had shown itself to be a vital factor. The reduced method was therefore experimented with to make use of this fact.

The acetate-viscose goods were treated at temperatures of from 80°F. to 195°F. for from 30 seconds to one hour, using varying concentrations of Katanol W with and without salt. These preliminary tests showed the following procedure to give the most satisfactory results.

Several swatches were pretreated at 185°F. in a solution containing 4 ounces Katanol W and ¾ ounce of common salt per gallon. After a period of 40 minutes the goods were rinsed in cold water and dried. Individual swatches from this group were dyed on the laboratory unit containing the vat color reduced with ½ to 1 ounce of caustic, 1 ounce of hydrosulfite and 4 to 8 ounces of common salt per gallon, depending on the type of vat dye applied. Finishing off after dyeing was carried out in the same manner as in the pigment method just described. The majority of the colors applied by this reduced method gave good unions on the acetate and viscose, and under the conditions used, saponification of the acetate was negligible.

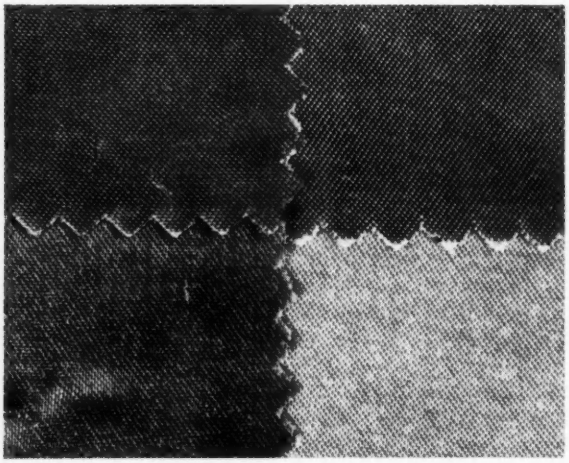
Browning Effect in Light Exposures

Unfortunately upon exposing these promising dyeings to Fade-Ometer tests, they were found to show a strong brown discoloration after only one to two hours. Since this defect had not been apparent in Fade-Ometer tests of the pigment-pad dyeings, it was evident that the longer treatment of the acetate-viscose fabric in the Katanol solution had resulted in a greater pick-up of the sulfur-phenol compound, and that this compound in turn was oxidizing in the light exposure to give the brown discoloration.

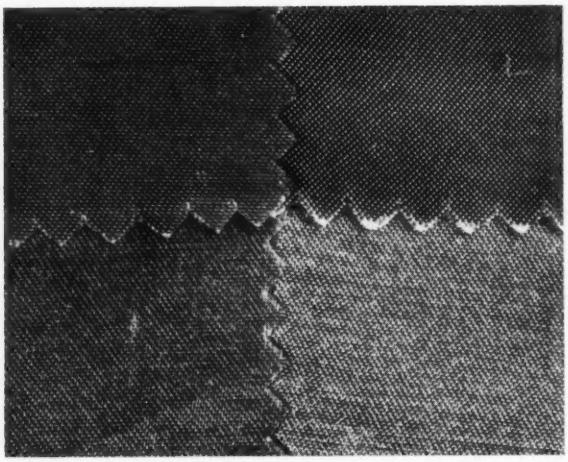
In an effort to prevent or retard this browning effect, the following approaches were tried:

1. Repeated soapings after dyeing.
2. Reducing solutions.
3. Treatment in acetic acid.
4. Antifume resins.
5. Antioxidants.

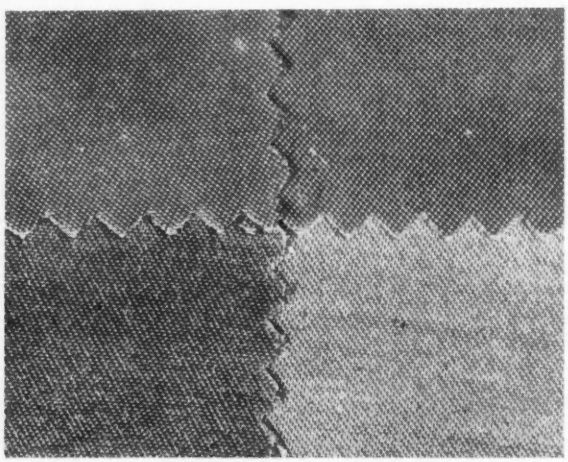
Repeated soapings brightened the shades somewhat, but gave only slight improvement in the light tests. Alkaline reducing solutions gave definite improvement, but stripped off too much color from the acetate when used in sufficient strength to be helpful. Treatment in concentrations of acetic acid up to 10 percent gave no



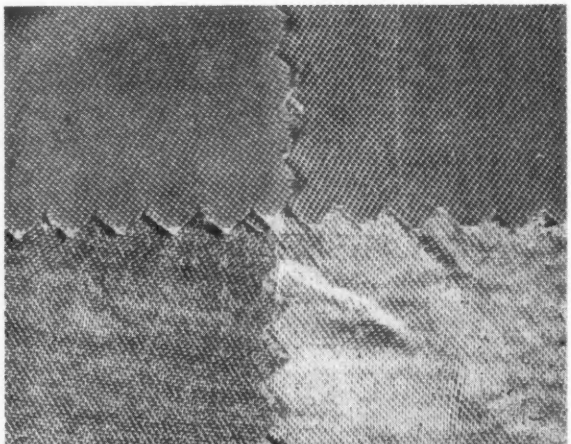
Ponsol Jade Green



Ponsol Red G.B



Indanthrene Golden Yellow RKA



Carbanthrene Flavine GC

In each photograph:

Left upper—treated back
Left lower—treated face
Right upper—untreated back
Right lower—untreated face

Photographs of specimen dyeings to illustrate the difference between goods treated with tannic-Katanol and untreated goods dyed in the same bath by the reduced method. Satin goods with acetate showing on the face and viscose on the back are shown above.

improvement. Several commercial resins, especially recommended for antifume purposes, were applied to the fabrics both after dyeing, and after only the Katanol treatment. None of these products gave the desired protection against browning in light. The variety of antioxidants available for this study was very limited and those used were ordinary reagents such as hydroquinone. None of these products offered any promise as a practical method of preventing browning of the Katanol. We feel that this type of treatment might have possibilities in this direction if an antioxidant were available which would be taken up by the acetate fiber, and held in high enough concentration after soaping to prevent the oxidation of the sulfur-phenol derivative left in this fiber by the pretreatment.

Substitutes for Katanol

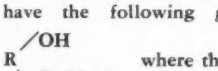
In an effort to obtain similar color union on the acetate and viscose fibers without the browning effect of the Katanol W, a large number of other compounds of somewhat the same chemical structure were experimented with under the conditions used for the W brand.

Because the Katanols contain both sulfur and phenolic groups, compounds were chosen of a variety of types which also contained these components. Among these substances were ordinary phenol and naphthol derivatives such as chloro phenols, amino phenols, beta hydroxynaphthoic acid, H acid, Neville and Winther's acid and chromotropic acid. Compounds such as thiourea and ammonium thiocyanate were included to represent the sulfur containing derivatives. None of these substances offered any promise in regard to increasing the color yield of vat colors on acetate.

In the field of specialized commercial products an apparently promising group, because of their use as tanning agents, were the so-called Syntans. Many of these substances are aromatic compounds containing hydroxyl, carboxyl, and other acid groups and condensed with formaldehyde, resins, lignin and other materials. They are sold in a variety of stages as aids to the leather tanner *(1)*. Of the dozens of these substances tried in this work, none had any appreciable effect in the dyeing of acetate which approached the results obtained with tannic acid or the phenol-sulfur compounds.

To complete the picture of the products which were experimented with unsuccessfully trying to find a satisfactory substitute for Katanol W, some of the compounds offered for the same purpose as the W brand, i.e., Katanol WL (U. S. Patent 2,070,207), Thiotan RS and Mordant O were naturally included. These substances have the virtue of not turning brown upon exposure to light, but were chemically too different from the W brand to increase the take-up of vat colors by cellulose acetate in as high a degree as that compound.

This group of compounds, which serve as resists for animal fibers in dyeing with substantive dyes, were examined further as a matter of information. It was found that those giving the best results in increasing the yield of vat colors on acetate were of the type which is believed to have the following general formula:



where the R stands for an aryl residue. The exact structure of these compounds is not too definitely known however, since there is a question as to whether there is only one or more than one S-SO_3H group in the molecule (U. S. Patent 1,600,525). Those types which serve as reserves, but did not show this increased color yield on acetate, are substances of well established structures such as: salts of the bis (2'.5' dichlorobenzoyl)-1.3 phenylenediamine - 4 - sulfonic acid or the bis (1.2.3 trichlorobenzene - 4 - sulfonyl) - benzidine - m.m' disulfonic acid (U. S. Patent 2,070,207) and other products which are very different from the first named group.

The Use of Tannic Acid

One type of tannic acid was used throughout the experimental and practical work on this problem. This was a commercial product sold as Tannic Acid 300, and, according to the manufacturer's records *(2)*, is produced from Chinese gall nuts, and has a tannin content of 33 percent. Although many other substances containing tannin are on the market, it was considered impractical to test this large group in this particular problem. One other type of dry tannin extract was checked however. This is sold as Myrtan, and although approximately as acid as the Tannic Acid 300, it did not increase the color yield on acetate in the same manner as the latter.

The results of the work with tannic acid alone can be stated very briefly. This compound served definitely to increase the color yield of the vat dyes on acetate, but the union of shade between this fiber and viscose fell just short of being satisfactory with the majority of vat colors, unless saponification of the acetate was allowed to proceed to too great an extent. The affinity of this product for the fibers was rather poor and high concentrations were necessary to obtain the desired results.

Combinations of Tannic Acid With Katanol

Of all the methods tried in this work, the most promising results from every point of view were based on combinations of tannic acid with the W brand of the Katanols. By mixing a comparatively small quantity of the latter product with tannic acid, satisfactory unions were obtained with a fairly complete range of vat colors. When this mixture was applied for short periods there was no appreciable browning of the acetate, thereby eliminating this serious defect when using Katanol alone. The Katanol improved the depth of shade on acetate and gave more uniform coverage of the goods than was obtainable with tannic acid alone.

A procedure then was set up, based on the idea of continuous processing, using the following steps for medium shades:

The vat pigment was added to a mixture of:

Per gallon of solution
1¾ lb. to 2½ lb. tannic acid
1 to 3 oz. Katanol W

dissolved separately and diluted to volume with water at 185°F. The goods were passed through this mixture on the dye unit at the above temperature and dried. After drying, the color was reduced at 185°-190°F. using:

2 to 4 oz. caustic
2 oz. hydrosulfite
0 to 8 oz. salt
¼ to 1 oz. vat dye
0 to 3 oz. white corn dextrin

depending on the characteristics of the color in question. After reduction, the goods were rinsed cold in dilute acetic acid oxidized with perborate, soaped with a synthetic detergent at 185°-190°F., rinsed and dried.

Table I gives a list of the vat colors checked by the above procedure in the laboratory with the comparative unions obtained on satin goods composed of filament acetate warp and filament viscose filling. Both fibers in this fabric were undelustered.

TABLE I

	Union between Acetate and Viscose	
Vat Color	*Untreated Goods*	*Treated Goods*
Ponsol Yellow G	Poor	Fair
Carbanthrene Flavine GC	Poor	Good
Calcosol Fast Yellow	Poor	Good
Indanthrene Golden Yellow IRK	Poor	Good
Carbanthrene Golden Orange G	Poor	Good
Calcosol Flaming Orange RR.	Poor	Good
Ponsol Orange YL	Poor	Fair
Cibanone Red RKC	Poor	Fair
Ponsol Red G_2 B	Poor	Good
Indanthrene Scarlet RA	Poor	Good
Ponsol Violet BNX Supra	Poor	Fair
Calcosol Brill. Violet RR	Poor	Good
Ponsol Blue BFC	Poor	Fair
Cibanone Blue GCD	Poor	Fair
Sulfanthrene Blue 2 BD	Fair	Good
Ponsol Jade Green BN	Poor	Good
Indanthrene Brown GAP	Poor	Fair
Indanthrene Brown RAP	Poor	Fair
Indanthrene Red Brown 5RF	Poor	Fair
Calcosol Brown BR	Poor	Fair to Good
Calcosol Navy Blue RA	Poor	Good
Calcosol Grey 2G	Poor	Fair to Good
Indanthrene Khaki 2G	Fair	Good

By using a mixture of tannic acid and Katanol W as a pretreatment, our experiments showed that similar results could be obtained by the reduced method as with the pigment procedure described above. The goods were treated with only tannic acid and Katanol, dried and then passed through the reduced color at 185°F., and finished off as previously described.

Practical Runs on Continuous System

Mill runs were carried out producing an olive shade and a green shade on 3.75 satin containing approximately 60% acetate and 40% viscose. Yarns were bright filament for both fibers. The continuous range used consisted of 4 Williams units in line with a 2-roll padder in front. Quantities used per gallon were as follows:

2 lb. 10 oz. tannic acid 33%
1 oz. Katanol W
3 ozs. Indanthrene Olive TA

The goods were padded through the above at 185°F. at a speed of 60 yards per minute. Without drying, the padded goods were passed into the Williams units charged as follows:

No. 1 4 oz. caustic
2 oz. hydro
185°F. 1 oz. white corn dextrine
No. 2 3½ oz. caustic
1¾ oz. hydro
185°F. 2/3 oz. dextrine
No. 3 ¼ oz. acetic acid 80%
Cold
No. 4 1 oz. sodium perborate
130°F.

After oxidation the goods were returned to the same machine for further rinsing and soaping.

The green shade was produced in the same manner using Ahcovat Jade Green instead of Olive. The resulting dyeings were very uniform throughout and showed satisfactory unions between the acetate and the viscose in both shades.

The Use of Metallic Salts

In the process of working out the best procedure for the results desired, treatments with metallic salts were naturally included because of their long established use as fixing agents for tannin bodies. Although all the common heavy metals were tested in the present problem, antimony salts proved to be the most useful here as in other processes. An intermediate treatment in a hot solution of tartar emetic, immediately following the tannic-Katanol step, served to improved the union of some vat dyes on mixtures of acetate and viscose. Unfortunately this useful feature was more than neutralized however by the fact that the fastness to gas fading of quite a number of these colors was lowered sharply when the heavy metal had been used. As may be seen in Table II, the same colors were entirely satisfactorfiy to the gas test when the metal treatment had not been included in the process.

TABLE II

	Color	Color Fastness: Light 10 hrs.	Light 20 hrs.	Light 30 hrs.	Light 40 hrs.	Gas** 3°	Tartar Emetic
1.	Carbranthrene Flavine GC	Good	Good	Good	Good	3	No
2.	Carbranthrene Flavine GC	Good	Good	Good*	Good*	3	Yes
3.	Ponsol Yellow G	Good	Good	Good	Good	3	No
4.	Ponsol Yellow G	Good	Good	Good	Good	3	Yes
5.	Indanthrene Golden Yellow RKA	Good	Good	Good	Good	3	Yes
6.	Carbanthrene Golden Orange G.	Good	Good	Good	Good	3	No
7.	Carbanthrene Golden Orange G.	Good	Good	Good	Good	3	Yes
8.	Calcosol Flaming Orange 2R	Good	Good	Good	Good	3	Yes
9.	Sulfanthrene Pink FB	Good	Good	Good*	Good*	3	No
10.	Sulfanthrene Pink FB	Good	Good	Good*	Good*	1	Yes
11.	Ponsol Red G2B	Good	Good	Good	Good	3	No
12.	Ponsol Red G2B	Good	Good	Good	Good	3	Yes
13.	Calcosol Violet 2R	Good	Good	Good	Good	3	No
14.	Calcosol Violet 2R	Good	Good	Good	Good	1	Yes
15.	Indanthrene Blue CLN	Good	Good	Good	Good	3	No
16.	Ponsol Blue BFN	Good	Good	Good	Good	1	No
17.	Ponsol Blue BFN	Good	Good	Good	Good	0	Yes
18.	Sulfanthrene Blue 2BD	Good	Good*	Good*	Good*	3	No
19.	Sulfanthrene Blue 2BD	Unsat.	Unsat.	Unsat.	Unsat.	0	Yes
20.	Carbanthrene Blue Green FFB.	Good	Good	Good	Good	3	No
21.	Carbanthrene Blue Green FFB.	Good	Good	Good	Good	1	Yes
22.	Calcosol Navy Blue	Good	Good	Good	Good	3	Yes
23.	Ponsol Jade Green	Good	Good	Good	Good	3	No
24.	Ponsol Jade Green	Good	Good	Good	Good	0	Yes
25.	Indanthrene Olive TA	Good	Good	Good	Good	3	No
26.	Indanthrene Olive TA	Good	Good	Good	Good	0	Yes
27.	Calcosol Brown BR	Good	Good	Good	Good	3	Yes

* Slight fade.

** Samples exposed for only 3 cycles. Ratings of 3° do not imply that samples may not stand additional gas cycles.

Additions of Dextrine to the Dyebath

Because of the value of special dextrines *(3)* in protecting the vat colors from deterioration at the high temperatures necessary in pigment-pad work, tests were made including this agent in the reduction bath. These tests indicated that 1 to 3 oz. per gallon of white corn dextrine served to protect the acetate from saponification to some extent as well as to keep the dye bath in a more stable condition. Additions of dextrine were therefore incorporated into the formulas of much of the final laboratory as well as the practical work carried out on this problem.

Vat Colors in Other Forms

In addition to the experiments with the vat dyes in their most common method of application, these colors were also tested by the acid-leuco method and in the soluble vat color form. The acid-leuco form offers an advantage when working with cellulose acetate in that the goods may be treated for longer periods in the dye bath with little danger of saponification. A representative group of colors tested by this method indicated that while there might be some advantage in using tannic acid and Katanol before entering the acid-leuco solution, the problem of maintaining the proper particle size of the dye for any length of time was rather a serious obstacle. We believe that further work in this direction may be of value.

As for the vat dyes in soluble form, our tests with a selected number of these colors did not show any advantage in using tannic acid or Katanol.

Fastness of Dyed Goods

Table II is a copy of the report of tests made by a large rayon weaving and finishing concern on medium shade laboratory dyeings produced by the tannic-Katanol method. These represent the mill's standard light and gas fading tests for rayon goods. It will be noted that the light fastness on the acetate and viscose satin goods follows the same pattern as on viscose or cotton goods. The only failures observed in either exposure were in a few colors, particularly blues, which did not stand up when antimony had been used in the dyeing procedure.

Dyeings were also subjected to the A. A. T. C. C. Wash Test No. 3, and the results showed that the colors as a group possess a very high degree of fastness in this respect on acetate and viscose goods which is comparable with their fastness on other fabrics.

TABLE III

Color	Percent Saponification		
	Lab. Dyeing Tannic-Katanol	Lab. Dyeing No Tannic-Katanol	Mill Dyeing Tannic-Katanol
Olive TA	5.18%	28.30%	1.24%
Jade Green	9.38%	29.26%	9.73%

Saponification

Although we had found it possible to produce very satisfactory union shades on acetate and viscose by the use of Katanol alone without saponification of the acetate, this was not possible when this product was applied for only a few seconds as established for the tannic-Katanol method. With this latter procedure, some saponification always occurred, and the amount of this saponification varied to some degree with the dye being applied as well as to changes in procedure.

Table III shows percentage of saponification of laboratory dyeing both with and without the tannic-Katanol combination of the same type dyes used in the mill runs. The degree of saponification in every case was calculated from the percentage of acetate in the original undyed goods.

Conclusion

In summarizing the results of this investigation we believe that we have accomplished the following worthwhile results in discovering a new approach to the dyeing of acetate and acetate mixed goods:

(1) The possibility of producing union shades with vat colors on acetate and viscose or cotton without the use of swelling agents.

(2) The possibility of dyeing acetate with these colors without saponification or with a minimum of saponification.

(3) The possibility of processing fabrics of this class with a very high degree of fastness especially to gas fading which is a serious problem with many of the popular shades on these goods at present on the market.

(4) The possibility of accomplishing the above objectives on existing dyeing equipment with little or no adjustment.

Although the yardage dyed on practical equipment by this new method has actually been small up to the present time, we feel that the excellent over-all appearance of the lots which have been processed, and the low degree of saponification resulting, indicate that with proper control large yardages are possible with many classes of this type of fabrics.

References

(1) "The Chemistry of Leather Manufacture" by G. D. McLaughlin and E. R. Theis, Rheinhold Publishing Corp., 1945.
(2) Private communication from American Cyanamid Co., Charlotte, N. C.
(3) "Stability of Vat Colors at Elevated Temperatures", Intersectional Contest Paper of Piedmont Section 1948, American Dyestuff Reporter, March 7, 1949.

Acknowledgment

This work would not have been possible except for the cooperation of many individuals and firms. The research committee of the Piedmont Section wishes to acknowledge the help of these individuals as well as that of the following organizations:

Amalgamated Chemical Corp.
American Cyanamid Co.
A. M. Tenney Associates
Burlington Mills Corp.
Calco Chemical Div.
Celanese Corp.
Ciba Co., Inc.
Clemson College
Du Pont Co.
General Dyestuff Corp.
Monsanto Chemical Co.
National Aniline Div.
Riegel Textile Corp.
Rohm and Haas
Stein, Hall and Co.
Tanexco, Inc.

—♦ ♦—

Student Chapter Meeting at L.T.I.

THE first meeting of the Lowell Textile Institute Student Chapter was held on Wednesday, October 5, 1949, at Lowell. The meeting was conducted by the officers elected for the 1949-50 school period: *Chairman,* Ludwig Rebenfeld; *Vice-Chairman,* Robert Morrison; *Secretary,* Dorothy A. McCarron; *Treasurer,* Joan L. Gregg. The most important business of the day was the appointment of chairmen of various committees to serve under the officers for the current year.

One delegate and one alternate were appointed to represent the L. T. I. Chapter at the meetings of the Intercollegiate Chemical Society, which the Chapter joined last year.

Student members were encouraged to attend the next meeting of the Northern New England Section, which was held on November 4, 1949, at Lowell Textile Institute.

Respectfully submitted,
DOROTHY A. McCARRON,
Secretary.

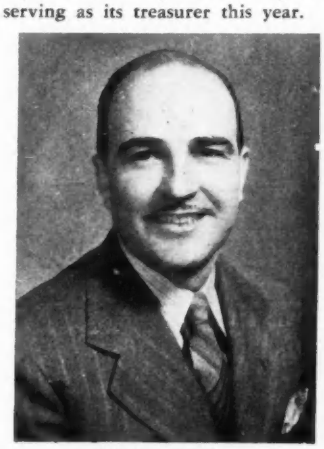
Joan L. Gregg

NNE Award to Joan L. Gregg

IN the Spring of 1948, an Annual Scholarship Award was created by the Northern New England Section of the American Association of Textile Chemists and Colorists. This award is to be made each year to the senior in the Textile Chemistry and Dyeing course at Lowell Textile Institute on the basis of scholastic standing, extracurricular activities and need.

The first scholarship was awarded by the Section to Walter E. Bill at its meeting in September, 1948. Mr. Bill attended schools of Lowell before entering Lowell Textile Institute. He was an outstanding student and was a member of the Association for three years. He received the degree of Bachelor of Science in June, 1949.

The second scholarship was awarded to Joan L. Gregg at the Section meeting in September, 1949. Miss Gregg is at present a senior at Lowell Textile Institute and has been a member of the Student Chapter there for two years. She served one year as secretary of the Chapter and is serving as its treasurer this year.



Walter E. Bill

Intersectional Contest—

DIMENSIONAL CHANGES OCCURRING IN SPUN VISCOSE RAYON FABRICS DURING PROCESSING ON MACHINERY USED IN SHRINKAGE STABILIZATION FINISHING*

Presented by the

PHILADELPHIA SECTION

Committee

Jackson A. Woodruff, *Chairman and Speaker*
Arthur W. Etchells
E. C. Neussle
Arnold L. Lippert
D. D. Gagliardi
R. H. Drukker
E. McCoy
T. R. Foltz
P. Theel

SHRINKAGE control of spun viscose rayon fabrics is today a finishing procedure of considerable importance and has made possible the entrance of such fabrics into the field of washable apparel. A great deal of practical and theoretical information concerning the formulae, application, and control of chemical treatments for use in modifying the properties of the fabrics to allow shrinkage stabilization has been published. However, no publications have been found which do more than touch the surface of the subject of mechanical finishing which is a very necessary part of any stabilization technique. In other words, the chemist—the scientist—has been provided with the ingredients and control, while the finisher—the artist—has been left for the most part to work out his problems by himself. For this reason and because of the inconsistency in wash test results shown by trade samplings of stabilized fabrics, it was decided a study of finishing procedures would be of considerable value.

In the realization that the use of a single chemical treatment might not reflect the same influences in finishing as some others, and in order to broaden the work, four types of chemical treatments were selected.

(1) Urea formaldehyde
(2) Melamine formaldehyde
(3) Glyoxal
(4) Alkali soluble cellulose ethers in combination with formaldehyde.

The first two are generally used in the trade where crease resistance is of primary importance and the latter two are more generally recommended for use in stabilization. It is not the objective of this paper to discuss any of the merits or demerits of any of the chemicals, and the figures to be given in results are not to be considered in that light; also, the choice of the wash tests selected for use has been for expediency only.

The finishing machinery of three plants was used and no uncommon equipment was included with the possible exception of an overfeed pin tenter used in some of the trials.

The program of work was grouped in two parts:

I. The laboratory work designed to picture the dimensional changes related to the effect of tension and relaxation of fabric under varying conditions of wetting, drying, and steaming, and
II. Dimensional changes of the fabric occurring during finishing on plant machinery.

Part I—Laboratory Procedures

The fabric used was a desized and scoured 68 x 62 challis using 30/1 spun yarn in the warp and filling. Swatches were cut 25" x 14" and markings were placed to designate 18" in the warp direction and 10" in the filling. A single CCC-T-191a cotton wash test showed the fabric at this point yielding 11% shrinkage in the warp and 5% in the filling direction. Five marked swatches were padded with a urea formaldehyde resin and then pin framed to a specified dimension somewhere between 16.5" and 18.5" in the warp direction and at a constant 10" in the filling. In this position, the swatches were dried and cured, after which their dimensional changes were obtained by measurement of the markings following their removal from the frames. All samples were then subjected to five CCC-T-191a cotton wash tests. The results of measurements of these five swatches, as well as one exposed to untreated control, are shown in Table I.

TABLE I

Original markings—18" on warp 10" on filling

Cured Dimensions		*After 1st Wash*		*After 3 washes*		*After 5 Washes*	
Warp	*Filling*	*Warp*	*Filling*	*Warp*	*Filling*	*Warp*	*Filling*
16.5"	10.0"	17.2"	9.8"	17.1"	9.9"	16.9"	9.8"
16.8	10.0	17.2	9.8	17.2	9.0	17.1	9.9
17.3	10.0	17.3	9.9	17.3	10.0	17.1	9.9
18.0	10.0	17.5	9.9	17.4	9.9	17.2	9.8
18.5	10.0	18.0	9.8	17.7	9.8	17.5	9.8
Control untreated							
18.0	10.0	16.0	9.3	15.7	9.6	15.6	9.5

* Presented in Intersectional Contest, Atlantic City Convention, October 14, 1949.

The swatch under untreated control shrank to 16.0" in the first wash. The resin treated fabrics cured at dimensions of 18" or greater shrank in the first wash tests while those cured at below 17" grew in length to approach the same dimensional level. The tendency shown leads not only to the conclusion that a tension during drying and curing can be found which will give for any one fabric the least variation in final shrinkage control wash test results, but also that slight variations in that tension would not cause serious trouble.

Swatches from challis fabric were subsequently subjected to varying conditions of tension and relaxation while at the same time varying the amount of moisture by wetting, drying, and steaming. In Table II, (a) represents a swatch which had previously been wetted and dried under sufficient tension as to produce an extension of 10% in the warp; while (b) represents the same fabric before subjecting it to the conditions of (a); and (c) represents a fabric which was resin treated under the same tensions and dimensions of (a). Swatches (a) and (b) were not resin treated.

For the experiments, all three fabrics were cut 10" in width (filling dimension) and approximately 22"-24" in length. The width of the swatches was left free to change during the experiments and the movements were not recorded. A distance of 18" was marked along the length of the swatches (warpwise) which left both ends sufficiently long so that each end could be sewn into a loop through which a round rod could be slipped. One rod was then attached to a frame so that the fabric hung freely. The lower rod was provided with an attachment for hanging various weights.

Wetting the swatches was done by spraying with a compressed air atomizer. Steaming was done by blowing steam with a hose over the fabric throughout the test period. This steaming did not appreciably wet the cloth. Readings of the dimensions were taken in the condition being tested after a period of ten minutes. Drying under tnesion was done by hanging the swatches and the weights in an oven at 300°F. for about 10 minutes. Slack drying was done by placing the swatches alone horizontally in an oven at 260°F. Readings of the dimensions of the dry fabric were taken shortly after the fabric cooled to room temperatures.

The results shown in Table II are based on the original length of 19" taken as 100%. A different set of three swatches was used for each of the three parts of Table II.

TABLE II
Viscose rayon challis

Part 1

Condition	Tension	Dimensional Changes Warpwise (a) Stretched Fabric	(b) Relaxed Fabric	(c) Resin Treated Fabric
dry	260g.	100.0	100.0	100.0
dry	2260g.	101.3	105.8	102.2
steamed	2260g.	105.0	109.8	103.7
dry	2260g.	105.0	109.8	103.7
dry	260g.	104.8	109.0	103.2
Part 2				
dry	260g.	100.0	100.0	100.0
wet	260g.	98.7	103.2	100.2
wet	2260g.	102.5	107.0	103.0
dry	2260g.	104.3	107.0	105.0
dry	260g.	104.3	107.0	105.0
Part 3				
dry	260g.	100.0	100.0	100.0
steamed	260g.	101.1	105.5	101.2
wet	260g.	98.9	104.7	100.8
dry	260g.	100.5	106.7	101.2

In Parts 1, 2, and 3, the magnitude of the dimensional changes is shown to be the highest with the relaxed swatches (b) and the lowest is shown by the resin treated swatches (c). The stretched swatches (a) and the resin treated swatches (c) showed an extension on being wetted while under tension, as do the relaxed swatches (b), but show a further growth on drying under tension not shown by (b). Steaming causes extension of all fabrics.

Table III shows the dimensional change of a single swatch of challis, when exposed to a series of wetting and drying cycles under varying tension conditions. The challis in this case is prepared as (a) of Table II (dried while stretched 10%).

The swatches responded as logically expected, in general, exhibiting a good example of the "memory effect" of previous distorting forces.

Table IV shows the dimensional change of four swatches each of the stretched 10% (a), relaxed (b), and resin treated (c) swatches of Table II. Initially, each of the four swatches was subjected to specified tensions during the first two steps of the wetting and drying cycles and then the wetting and drying cycles were repeated without tension.

TABLE III
Dimensional Changes of Spun Viscose Rayon

Condition of fabric		Grams tension	% length (warpwise)
dry	...	430	100
dry	...	2430	101.2
...	wet	2430	104.4
dry	...	2430	105.4
...	wet	2430	105.6
dry	...	2430	105.6
...	wet	2430	106.0
dry	...	2430	106.0
dry	...	430	106.0
...	wet	430	103.0
dry	...	430	103.0
...	wet	430	103.0
dry	...	430	103.0
dry	...	0	103.0
...	wet	0	99.8
...	wet	2430	104.4
dry	...	2430	105.2
dry	...	0	105.2
...	wet	0	100.2
...	wet	2430	104.4
dry	...	2430	105.4
dry	...	0	105.4
...	wet	0	100.5
dry	...	0	97.4

TABLE IV
Viscose Rayon Challis
Dimensional Changes Warpwise

Tension stretched fabric: (a)	1340 grams	2340 grams	3340 grams	5340 grams
wet—tension	100.2	102.7	104.2	109.1
dried—tension	103.5	105.5	106.2	....
dry—no tension	103.5	105.2	106.2	....
wet—no tension	97.3	98.2	98.2	....
dried—no tension	91.8	92.4	92.4	....
wetted and pressed dry	94.5	95.7	95.3	....
relaxed fabric: (b)				
wet—tension	107.2	108.1	112.2	112.7
dried—tension	109.8	111.0	114.2	....
dry—no tension	109.8	109.8	113.3	....
wet—no tension	103.2	103.2	101.8	....
dried—no tension	96.0	96.0	96.0	....
wetted and pressed dry	99.4	99.2	101.3	....
(Note: Relaxing increased the warp yarn count, inasmuch as the fabric was relaxed before the 10" width was cut.)				
resin treated fabric: (c)				
wet—tension	103.0	104.4	104.4	106.1
dried—tension	105.0	106.2	106.2	....
dry—no tension	104.4	105.2	105.2	....
wet—no tension	101.5	101.3	101.3	....
dried—no tension	99.3	99.7	98.8	....
wetted and pressed dry	100.4	100.2	99.3	....

TABLE V
Stretching of Viscose Rayon While Dry

Tension:	*0*	*1340g.*	*2340 g.*	*3340g.*	*0*
Stretched 10% (a)	100.0	101.5	102.0	102.7	101.3
Relaxed fabric (b)	100.0	107.2	108.2	109.4	105.0
Resin treated (c)	100.0	101.5	102.0	102.7	100.2

The most important result is perhaps that shown by the decreased magnitude of the dimensional changes shown by the resin treated swatches (c) in comparison with (a) or (b).

Table V shows the percentage dimensional change of swatches of dry challis prepared in the three ways as expressed in Tables II and IV (a), (b), and (c). Each swatch was subjected to increasing tensions and then relaxed.

This table shows that resin treatment (c) does not decrease the magnitude of dimensional change affected by a range of increasing tensions on dry fabrics provided the history of the fabrics before testing is the same. However, the recovery of the resin treated fabric after release of tension is considerably improved as compared to untreated fabrics.

Part II—Procedures for Plant Trials

In general, the plant trials centered on the following sequence of operations: padding, drying, curing, washing, drying, and final finishing operations such as steam framing, or framing, and decating. The study of dimensional changes with few exceptions commenced at the time of entrance of the fabric into the padder with little attention paid to the original greige lengthwise dimension. The desired finished width was known and the procedures designed to give the desired final width.

Prior to padding the chemical treatment, permanent markings spaced 18" apart were placed on the scoured and dyed fabrics in both warp and filling directions. After the fabric had passed through each machine used in the process, the dimensional changes shown by movement of these marks were recorded. It was realized that for accuracy, it would be necessary to obtain identical regain of moisture by the fabric before taking the measurements. However, in order to maintain continuity in processing, there was no time allowed for conditioning of dried or cured fabrics so that an error of 0.1" was to have been expected in figures obtained directly after curing or drying. Each measurement change was converted into a percentage difference based on the original 18" marks placed prior to padding. A (+) value indicates that a gain or stretch was effected and a (—) value means a loss or shrinkage. Since all processing percentages are based on the original 18" marks, it follows that a +3.0% followed by a +2.0% indicates a processing loss has occurred between the measurements, although a +2.0% figure shows that the fabric is still 2.0% greater in the direction considered than it was when the original 18" marks were placed. The changes in dimensions are termed *processing* gains or losses and must not be confused with the *shrinkage* control results which are based on wash tests of the fabrics.

In most of the cases, a single boiling CCC-T-191a cotton wash test was run on a section of the fabric removed after curing. The final wash test results on the finished fabric were run as five consecutive CCC-T-191a tests. These shrinkage control results are expressed as percentage *shrinkage* based on fresh 18" measurement marks placed on the fabric at the time of commencing the wash tests. As in the case of the processing figures, the shrinkage results from the wash tests are expressed as + or — percentages, (+) meaning gain in dimension and (—) meaning loss in dimension.

In the plant work, no control was run (such as a fabric going through the machinery) without treatment with a chemical or resin. If a comparison were desired of the shrinkage control obtained by use of experimental unproved resins or chemicals, an untreated control could well be used as a reference. However, in the work under discussion it was assumed that the choice of chemical or resin was correct and properly executed and that the machinery effect on an untreated sample would be confusing as a comparison.

The first example of the procedure is illustrated in Table VI. Here are shown

TABLE VI
Final Wash Tests Shrinkage Figures

Plant #1			*Plant #2*			*Plant #3*		
Machine	*% Processing Change*		*Machine*	*% Processing Change*		*Machine*	*% Processing Change*	
	Warp	*Filling*		*Warp*	*Filling*		*Warp*	*Filling*
(1) Pad	—0.3	—1.1	(1) Pad	+8.3	....	(1) Pad & Dry	+3.5	+2.8
(2) Dry	0.0	—5.3	(2) Dry	+9.2	+1.4	(2) Cure	+2.8	+2.8
(3) Cure	+0.6	—5.3	(3) Cure	+8.6	0.0	(3) Wash	+1.4	+2.8
(4) Wash	+1.4	0.0	(4) Wash	+6.7	—1.1	(4) Dry	+1.4	0.0
(5) Dry	+0.6	—6.8	(5) Dry	+6.4	—1.1	(5) Steam Frame	+2.1	+5.6
(6) Steam Frame ..	+1.7	—0.6	(6) Steam Frame ..	+9.2	0.0			
(7) Decate	+2.5	—2.8	(7) Decate	+7.8	—0.3			

	Plant #1		*Plant #2*		*Plant #3*	
	Warp	*Filling*	*Warp*	*Filling*	*Warp*	*Filling*
1st wash.....	—3.3	+1.4	—1.9	—1.1	—1.1	—3.3
2nd wash.....	—3.9	+1.1	—2.5	—0.3	—1.9	—3.6
3rd wash.....	—4.2	+1.7	—4.2	—1.1	—3.1	—3.9
4th wash.....	—4.7	+1.1				
5th wash.....	—5.8	+1.4				

	Plant #2	
	Warp	*Filling*
Wash test after cure	—3.8	—1.1

		Warp	*Filling*
% processing figure at cure	=	+8.6	0.0
% wash test after cure	=	—3.8	—1.1
Estimated correct final processing figure (decating)	=	+4.8	—1.1
Actual final processing gain	=	+7.8	—0.3
Estimated shrinkage wash test	=	—3.0	—0.8
Shrinkage in first wash test	=	—1.9	—1.1
Error	=	1.1%	0.3%

the processing figures and the wash test shrinkage figures on a single, identically prepared fabric treated in three different plants. The chemical used for stabilization was the same base resin, but it was prepared as desired by each plant.

Table VI shows that all three sets of processing figures are different in both the warp and filling directions. Only one plant provided a set of shrinkage test results below —2.0% in both warp and filling. In analysis, Plant #1 shows insufficient tension in the warp during steps 1, 2, and 3. The remaining steps are normal and would be easily compensated by increased tension in either step 1 or 2, or both. The filling processing figures indicate relaxed handling during steps 2 and 3 and insufficient pulling out at step 6. The Plant #2 figures show a more balanced processing for this fabric resulting in satisfactory percentage shrinkage in the wash test figures in both warp and filling. At the same time, it can be noticed that 5.0% more yardage was obtained in Plant #2. Plant #3 shows good warp processing but poor filling control. The final framing contained too much widthwise stretch, that effect being clearly shown in the shrinkage wash test figures.

The wash test after curing in the Plant #2 trial was interpreted as follows: (See Table VI.)

The greatest margin of error was in the warp and this condition will be seen in later results to be rather general. Until more is known of this technique, it can only serve as a rough guide. The error refers to the inaccuracy of the prediction of the first wash test.

After seeing the results of Plant #2 with its additional 5% yardage yield, a second trial was run in Plant #2 to see if satisfactory shrinkage wash tests could be achieved with processing in the same plant but varying the conditions of tension during the steps 1, 2, and 3. The results of both Plant #2 trials are shown in Table VII.

The shrinkage wash test results are seen to be nearly identical and the yardage difference based on processing gain is exactly 5%. It should not be felt that the coinciding figures represent unusual accuracy of treatment. A difference existing in duplicate trials of ±0.5% would be more normal. These figures give an excellent example of two distinctly different approaches to the same final wash test or consumer needs, yet one fabric has 5% less picks than the other. Put in a different fashion, it may be said that the converter has gained yardage but a discerning consumer might well prefer the fabric with the higher pickage.

Table VIII shows a second type of resin treatment applied in one plant to a single fabric under differing tension conditions in steps 1, 2, and 3.

The results of the trials in Table VIII show, in favor of Trial "A" which has the greater tension in steps 1, 2, and 3. In examining Trial "B" it would appear that under the conditions of this resin treatment there is less resistance to pull during steps 6 and 7 than is shown in Trial "A". Correlation with the results of the laboratory work can be seen. The relaxed treated fabric is more easily extended in dimension than is the fabric with the history of previous stretch.

Table IX shows the results of a chemical treatment applied to a fabric which normally shows a very high shrinkage; therefore, the results of the wash tests appear high in comparison with previous tables. However, it again provides a comparison in the effect of tension during steps 1, 2, and 3 in Trial "A" and that of the more relaxed treatment in 1, 2, and 3 of Trial "B".

From the results, it is seen that Trial "A" (with the tension at steps 1, 2, and 3) is again the better, resulting in lower shrinkage figures in wash tests. It is noteworthy, the manner in which this fabric responds in shrinkage during washing at steps 4, especially in Trial "A". The resistance to low weight pulls during step 6 causes a final processing figure which is too great again if good shrinkage tests are desired (below 2%).

The fourth set of chemical treatments is shown in Table X where again the Trial

TABLE VIII

Processing Measurements

	Trial "A" Warp	Trial "A" Filling	Trial "B" Warp	Trial "B" Filling
(1) Pad	+7.5	..	+3.6	..
(2) Dry	+9.7	+1.1	+1.1	+1.1
(3) Cure	+9.2	+0.8	+1.1	+1.1
(4) Wash	+6.4	+0.6	+1.7	+0.6
(5) Dry	+4.7	—1.4	—1.4	—1.4
(6) Frame	+5.8	+0.3	+3.1	—0.3
(7) Decate	+5.8	0.0	+3.1	—0.3

Final Wash Tests

	Trial "A" Warp	Trial "A" Filling	Trial "B" Warp	Trial "B" Filling
1st wash	—1.9	—1.1	—3.3	+ .3
2nd wash	—3.1	—1.1	—4.2	— .3
3rd wash	—4.7	—1.9	—5.3	—1.4

Wash Test on Samples Cut After Cure (3)

	Trial "A" Warp	Trial "A" Filling		Trial "B" Warp	Trial "B" Filling
	—3.3%	—3.3%		—1.4%	—1.7%
				Warp	Filling	Warp	Filling
% processing figure, step #3			=	+9.2	+0.8	+1.1	+1.1
Wash test after cure			=	—3.3	—3.3	—1.4	—1.7
Estimated step #7			=	+5.9	—2.5	—0.3	—0.6
Actual step #7			=	+5.8	0.0	+3.1	—0.3
Estimated wash test			=	—0.1	—2.5	—3.4	—0.3
Actual wash test			=	—1.9	—1.1	—3.3	+0.3
			Error =	1.8	1.4	0.1	0.6

TABLE VII

	Plant #2 (Tension in 1, 2, 3) Warp	Plant #2 (Tension in 1, 2, 3) Filling	Plant #2 (Relaxed in 1, 2, 3) Warp	Plant #2 (Relaxed in 1, 2, 3) Filling
(1) Pad	+8.3	..	+2.8	..
(2) Dry	+9.2	+1.4	+1.1	+1.1
(3) Cure	+8.6	0.0	+0.8	+1.4
(4) Wash	+6.7	+1.1	+2.2	+3.6
(5) Dry	+6.4	—1.1	0.0	+0.8
(6) Steam Frame	+9.2	0.0	+5.0	+1.1
(7) Decate	+7.8	—0.3	—2.8	+0.8

Shrinkage Results

	Warp	Filling		Warp	Filling
1st wash	—1.9	—1.1	1st wash	—1.9	—0.3
	Warp	Filling		Warp	Filling
Wash test on cured sample	—3.8	—1.1	Wash test on cured sample	—1.1	—0.8

	Warp	Filling	Warp	Filling
% processing figure, step #3 (cure)	+8.6	0.0	+0.8	+1.4
Wash test after cure	—3.8	—1.1	—1.1	—0.8
Estimated correct processing figure, step #7	+4.8	—1.1	—0.3	—0.6
Actual final processing gain	+7.8	—0.3	+2.8	+0.8
Estimated shrinkage wash test	—3.0	—0.8	—3.1	—0.2
Actual shrinkage in first wash test	—1.9	—1.1	—1.9	—0.3
Error	1.1	0.3	1.2	0.1

TABLE IX
Processing Measurements

	Trial "A" Warp	Trial "A" Filling	Trial "B" Warp	Trial "B" Filling
(1) Pad	+8.3	..	+4.4	..
(2) Dry	+9.7	+0.3	+3.6	+1.1
(3) Cure	+8.9	0.0	+2.5	+0.8
(4) Wash	+1.7	—0.8	—0.6	—0.8
(5) Dry	—0.8	—1.9	—4.4	—1.9
(6) Steam Frame	+3.6	—0.8	+1.7	—0.3
(7) Decate	+3.6	—2.2	+2.2	—1.7

Final Wash Tests

	Warp	Filling	Warp	Filling
1st wash	—4.7	+1.7	—6.1	+1.4
2nd wash	—5.8	—0.3	—6.1	+2.2
3rd wash	—5.3	—1.7	—7.2	—0.8

Wash Test on Samples Cut After Curing

	Warp	Filling		Warp	Filling	Warp	Filling
	—8.9	—2.2			—7.2	—3.6	
				Warp	Filling	Warp	Filling
% processing figure, step #3			=	+8.9	0.0	+2.5	+0.8
Wash test after cure			=	—8.9	—2.2	—7.2	—3.6
Estimated Step #7			=	0.0	—2.2	—4.7	—2.8
Actual Step #7			=	+3.6	—2.2	+2.2	—1.7
Estimated wash test			=	—3.6	0.0	—6.9	—1.1
Actual wash test			=	—4.7	+1.7	—6.1	+1.4
		Error	=	1.1	1.7	0.8	2.5

"A" and Trial "B" represent tension conditions in 1, 2, and 3 and relaxed conditions 1, 2, and 3 in Trial "B"', respectively. These two treatments included a calendering operation after the cure for mechanical hand improvement.

Table X shows a difference in tension at steps 1, 2, and 3 but the processing figures show that, compared with the previous tables, the tensions involved in Table X are really much lower than in the other cases. This is the first table in the discussion to show positive figures in the wash test of the warp (Trial "A"). Actually the negative wash test figures of Trial "B" are more to be preferred for consumer end use. Such positive figures, however, do provide an opportunity for less care in handling of final finishing as more tension can be used to reduce the (+) to a negative. The purpose of showing the figures is to show the difference between the two trials "A" and "B". This difference is just as great as in the other trials but is a shift in the scale from processing gain to processing loss.

TABLE X

	Trial "A" Warp	Trial "A" Filling	Trial "B" Warp	Trial "B" Filling
(1) Pad	+2.5	..	+0.6	..
(2) Dry	+0.6	+0.3	—6.1	—5.6
(3) Cure	0.0	0.0	—5.8	—5.3
(4) Calender	+3.1	+0.8	+1.7	—4.7
(5) Wash	0.0	—0.6	—2.8	—0.3
(6) Dry	—6.1	—1.7	—8.9	—4.2
(7) Frame and Decate	—4.4	0.0	—5.3	0.0

Final Wash Test Shrinkage Results

	Warp	Filling	Warp	Filling
1st wash	+2.2	—0.6	—1.7	—1.1
2nd wash	+1.7	—0.8	—1.7	—0.8
3rd wash	+1.9	0.0	—2.2	—0.6
4th wash	+0.6	—0.8	—1.7	—0.6
5th wash	+1.9	0.0	—1.7	—0.6

In all tables up to this point, of the discussion only a single fabric has been considered at a time. Table XI shows the processing figures and wash tests of a series of different fabrics treated on the same machinery with the same chemical treatment and with tensions maintained as close as possible.

The fugi shows rather poor wash test figures while the others are all good. The cause for the difference appears to be the lack of resistance of the treated fugi to the pulling out tendency of steam framing. This step caused a +7.2% processing extension while the other three materials show less than 4.0% extension at the same step.

Table XII shows a fabric treated in two different tension techniques in order to determine in which processing steps elongation of the warp and filling may be considered important. In (A), the fabric was padded under tension and then dried and cured relaxed. In (B), the fabric was padded, dried, and cured all under tension. The remaining processing steps were identical and as relaxed as commercially possible with the exception of the fillingwise stretch in the framing.

The results of these two trials tend to show that tension at the time of padding is all that is essential in order to hold down the processing loss. Trial (A) shows a gain in dimensions in washing (step #4) and Trial (B) shows a loss in the warp and a slight gain in the filling in the same step. In spite of this difference in the two techniques, the final processing figures are identical and the initial wash tests are also very close.

TABLE XI
Shrinkage During Processing

	Fungi Warp	Fungi Filling	Gabardine Warp	Gabardine Filling	Slack Suiting Warp	Slack Suiting Filling	Chambray Warp	Chambray Filling
(1) Pad	+5.8	....	+7.8	....	+ 9.2	0.0	+8.0	—3.1
(2) Dry	+5.8	+3.3	+7.2	—1.1	+10.3	0.0	+8.0	—1.3
(3) Cure	+4.7	+1.9	+6.7	—1.1	+ 8.9	—1.9	+7.8	—1.6
(4) Wash	+4.7	+1.1	+5.6	—2.2	+ 5.8	—0.5	+6.3	—2.2
(5) Squeeze	+2.5	+2.5	+4.4	+1.4	+ 6.4	+2.5	+5.8	0.0
(6) Dry	—3.6	—1.4	+0.8	—4.4	+ 3.3	—3.0	+3.6	—3.6
(7) Frame	+3.6	+1.7	+3.3	—2.2	+ 5.5	—0.8	+4.7	—0.5
(8) Decate	+3.6	+1.4	+3.3	—2.8	+ 5.0	—1.4	+5.0	—1.4

Wash Test Shrinkage Results — CCC-T-191a

	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling
1st wash	—4.4	—1.4	—0.6	+1.6	—0.3	—1.1	—0.5	—0.2
2nd wash	—2.8	—0.6	—0.6	+1.6	—0.5	—1.3	—0.2	0.0
3rd wash	—5.0	—1.1	—0.6	+1.6	—0.5	—0.8	—0.2	0.0
4th wash	—5.3	—1.1	—0.8	+0.8	—0.8	—0.5	—0.2	0.0
5th wash	—3.6	—0.8	—0.8	+1.4	—0.5	—0.5	—0.2	0.0
Wash test after cure %			—1.7	—0.3	—2.5	0.0		

	Gabardine Warp	Gabardine Filling	Slack Suiting Warp	Slack Suiting Filling
Step #3	+6.7	—1.1	+8.9	—1.9
Wash test after cure	—1.6	—0.3	—2.5	0.0
Estimated step #8	+5.1	—1.4	+6.4	—1.9
Actual step #8	+3.3	—2.8	+5.0	—1.4
Estimated shrinkage	—1.8	+1.4	—1.4	—0.5
Actual shrinkage	—0.6	+1.6	—0.3	—1.1
Error	1.2	0.2	1.1	0.6

Observations and Conclusions

PAD & TENTER.—The study of dimensional changes occurring in spun viscose fabrics during finishing operations has provided considerable practical information with the promise also that further work would be remunerative.

TABLE XII

Processing Measurements

	(A) Warp	(A) Filling	(B) Warp	(B) Filling
(1) Pad	+7.5	+0.8	+8.1	....
(2) Dry	+3.6	—1.4	+6.4	+1.9
(3) Cure	+2.8	—2.8	+6.1	+0.8
(4) Wash	+4.4	+2.8	+4.2	+1.7
(5) Dry	—1.1	—2.5	—0.3	—0.6
(6) Frame and Decate	+3.6	—0.6	+3.6	—1.4

Final Wash Tests

	Warp	Filling	Warp	Filling
1st wash	—2.5	—0.3	—2.8	—1.1

Breaking down the obtained information stepwise by individual machines used, it is shown in general that it is easier to achieve the desired final shrinkage test results if a tension is applied during either the padding (1) operation and/or the drying operation (2). (It is assumed that the drying is done on a tenter frame to hold the desired width.) The tension to be applied appears to be of the order that would cause an extension of the warpwise dimension of from 3.0 to 8.0% on a fabric which had shrunk approximately 8.0% in going from the greige to dyed and dried state.

CURE.—Tension during the cure (3) in excess of the tensions attained in drying was not tested in plant trials because most normally used curing machines today are without appreciable tension in either warp or filling directions. The dimensions of the previously dried fabric are usually closely maintained.

CALENDER.—The machine to use following the cure can be varied depending upon the finisher. The calender is one which causes considerable warpwise extension. This extension was apparently without harm when followed by relaxed washing and drying. There is a possibility that such flexing and extension followed by wet and dry relaxation may even reduce the possible adverse effect of the final tentering or decating operations.

WASHING.—Washing is a step forced upon the producers of quality merchandise in order that the soluble chemicals remaining in the fabric may be removed. However, it is often this relaxed wetting followed by relaxed drying which makes possible the achievement of the best low final shrinkage tests. Both the laboratory work and the plant work give this indication. The washing is not usually without some tension but fortunately the forces tending to cause shrinkage here are fairly strong. It should be remembered that too much tension during the removal of the excess moisture and in opening the fabric can overcome the beneficial effects of relaxed washing.

DRYING.—The final drying can be done in several types of machines. A moderately relaxed fabric condition appears advisable. The auxiliary equipment such as tension bars, guiders, etc., at the entrance to a dryer can have harmful tension effects as can the roll up device at the delivery end of the dryer. The flexibility of final drying and finishing can be aided by a machine which will dry, remove wrinkles, and not restrict shrinkage unduly. An overfeed pin tenter is an answer. In such a machine the filling dimension can be controlled, steam can be used to remove wrinkles, and the overfeed can aid the tendency towards shrinkage.

All operations on machinery used after relaxed drying, result in a processting gain when referred to the dried condition. When too great a change of warpwise dimension is caused, it is necessary to rewet the fabric and redry in order to regain the necessary shrinkage. Treatment in a button breaker to reduce boardiness in a fabric would be an example of producing extension recoverable only by a wetting and drying cycle.

A wash test after cure can be used as a rough measure of the processing gain or loss to be allowed in the final finishing. Possibly due to the inaccuracy of the wash tests and the individual processing figures, a $\pm 1.0\%$ error is found in such predictions. The number of tests made were not large enough nor were the conditions of the trials sufficiently constant to find out just how accurately this could be developed. It is thought that continued practice might uncover mathematical constants which would aid in the predictions.

It has been known for some time that for proper shrinkage control results, emphasis must be placed first on the proper desizing and preparation of the fabric and next on the application of the chemical or resin treatment. The study of dimensional changes shows that this emphasis must be extended to cover the knowledge and use of tension effects of the finishing machinery used in the process.

NNE Contest Paper—

(Concluded from Page P815)

the ammonium acetate method; at present it is intermediate.

As a further check on the value of the methods given, a comparison of two direct dyes on cotton fabric was made. Here the condition as regards assistants, time, temperature and concentration of dye were kept constant. Of the two dyes used, Sky Blue FF (Color Index No. 518) is listed by Whittaker as having a time of half dyeing (on viscose) of 15.9 minutes while the Diphenyl Fast Blue Green BL is listed as 159.2 minutes. It is well known that the lower the time of half dyeing, the more level are the results. The Sky Blue is also listed as exhausting 44% under certain conditions and the Fast Blue Green as 20%. It is also known by experience that the faster the exhaustion the poorer the penetration. To sum up, the literature indicates that Sky Blue FF should have a higher exhaustion, higher levelling but poorer penetration than Fast Blue Green. A glance at Table VI shows that these properties are determined by the tests described and the additional information given by the "strike" shows why the penetration is so poor.

Summary

It has been demonstrated that we can, by means of four tests which have been described, predict the performance of one dye as compared with another, of one dyeing method as compared with another, of one assistant as compared with another, of one concentration as compared with another, or of one textile material as compared with another.

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NNE Section to Meet Dec. 2

THE December meeting of the Northern New England Section will be held Friday evening, December 2nd, at the Hotel Vendome, 160 Commonwealth Avenue, Boston, Mass.

The speaker will be Kenneth H. Barnard, Technical Assistant to Manager, Textile Resin Department, American Cyanamid Company. He will give a paper entitled "New Developments in Textile Resins."

Reservations for the dinner preceding the meeting will be handled by Edward B. Bell, Textile Aniline & Chemical Co., 49 Blanchard Street, Lawrence, Mass.

Cellulosic Fibers Group Meeting—

VAT DYEING: IMPORTANCE OF INITIAL EXHAUSTION RATE*

O. W. CLARK and H. R. McCLEARY

American Cyanamid Company, Calco Chemical Division

OVER the years, there have been several approaches to the problem of selecting vat dyes for application by various dyeing processes. Boulton and Morton *(1)*, for example, made an extensive study of the application of vat dyes to viscose rayon. Other studies *(2)*, *(3)*, have outlined simplified experiments which can be carried out in a mill. In any practical approach to this problem, a preliminary separation of the full range of vat dyes is necessary in order to select the limited group of dyes which conforms to the required specifications of shade, fastness and cost. From this group the dyer then selects the specific dyes which, on the basis of his experience with vat dyes in his equipment, are considered best from the viewpoint of general dyeing behavior. Dyeing behavior, involves a consideration of such factors as solubility, leuco stability, rate of dyeing, degree of exhaustion, rate of diffusion, and the effect of temperature on these properties. The ultimate aim of this selective process is the development of dye formulas which will yield level and well-penetrated dyeings and which, when used during very long continuous runs, will yield dyeings of uniform shade and strength.

The present paper is concerned with the exhaust behavior of vat dyes on cotton cloth. Accurate data on the exhaust behavior of several vat dyes from the leuco bath have been obtained by using the Dyeometer *(4)*, to record the decrease in dye concentration of the dye bath throughout the course of a dyeing experiment. The results of laboratory continuous reduced dyeings are examined in relation to these exhaust data.

Dyeometer Dyeings and Dyeing Curves

Essentially the Dyeometer is an all-glass apparatus which contains the dye bath and the material to be dyed, and which permits continuous photometric measurement of the concentration of dye in the bath by means of an observation cell. Volume of the dye bath, temperature, rate of dye bath circulation, movement of the material and the atmosphere in the Dyeometer are under rigid control.

The Dyeometer dyeings were made with 5% dye on 80 x 80 cotton print cloth in a liquor ratio of 1:40, using two-thirds ounce of caustic soda and two-thirds ounce of sodium hydrosulfite per gallon. The dye was reduced in the full volume of dye bath at 120°F. until inspection of spectrophotometric curves showed that conversion to the leuco compound was complete. The cloth was then entered and dyed for 45 minutes at 120°F. The use of a recording spectrophotometer permitted measurements of bath strength at least every twenty seconds during the first few minutes of dyeing where exhaustion was rapid. These measurements yielded data from which could be plotted a curve of dye bath strength versus time. Figure 1 shows such a dyeing curve for a 5% dyeing with Vat Gray 2G Double Powder on cotton in a liquor ratio of 1:40 at 120°F.

From a dyeing curve certain facts are directly evident or can be calculated. For example, at the end of a practical dyeing period such as 45 minutes, the degree of exhaust can be read from the plot. While true equilibrium exhaustion in most dyeings is not attained in 45 minutes, the exhaustion at such a point may be regarded as a practical equilibrium value, since 45 to 60 minutes is the economical time limit placed on most vat dyeings. When dyeing curves for a range of vat dyes are available, an estimate of the relative rates of exhaustion may be made by comparison of the various curves. In many dyeing processes, however, the exhaustion rate during the first few seconds of dyeing may be the important factor in determining general dyeing properties. Visual inspection of dyeing curves usually does not give accurate comparisons of exhaustion rate at the very beginning of dyeing and it is therefore necessary to use a more accurate method for determining these rate values.

Initial Exhaustion Rate (IER)

By a graphical and mathematical procedure, it is possible to calculate a value, which in this paper is called the "Initial Exhaustion Rate" and which will subsequently be abbreviated as IER. The IER is expressed as % exhaustion per minute

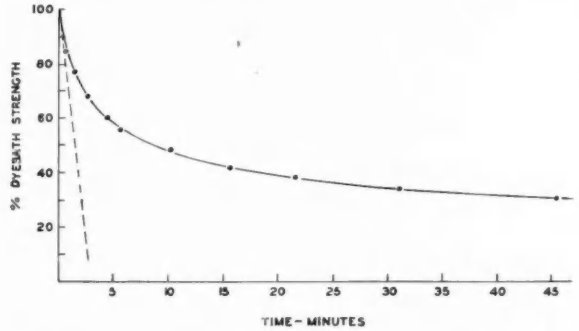


Figure 1—5% Dyeing of Vat Gray 2G at 120°F; Liquor Ratio—1:40.

* Presented at Cellulosic Fibers Group Meeting, Atlantic City National Convention, October 15, 1949.

compared to initial bath strength. The dashed line in Figure 1, the slope of the curve at the start of dyeing, is a graphical representation of the IER, which was calculated as outlined below.

The IER values for all Dyeometer dyeings of the present paper were calculated by an empirical method described in a previous paper *(5)*. Briefly, the method is based on a logarithmic plot of percent dye bath strength (D) versus (m + t) in which (t) is dyeing time in seconds and (m) is an arbitrary constant (usually 50-200) chosen by trial so that the points representing the dyeing up to half the equilibrium value fall along a straight line. The slope (S) of this line is given by:

$$S = \frac{d \log D}{d \log (m + t)}$$

The exhaustion rate in per cent per minute is then given as:

$$\frac{dD}{dt} = \frac{60DS}{m + t}$$

and the IER is:

$$\frac{S}{-6000} \text{ — per cent per minute.}$$

$$m$$

In some previous work using this method of calculation, it was found that the straight line extrapolates to a value less than 100% dye bath strength at zero dyeing time. The difference between 100% and the extrapolated value has been interpreted as the so-called "strike" (i.e., the initial instantaneous exhaustion which establishes a surface concentration of dye on the fibers of a textile material entered into a dye bath). In the present paper, however, the straight line of the logarithmic plot was drawn so as to include 100% bath strength at zero time as an experimental point, and thus incorporate the "strike" as a part of the IER value. "Strike" as referred to in the present paper is the very rapid initial exhaustion which takes place, probably in the first second of dyeing, and is therefore different from the "strike" discussed by Boulton and Morton*(1)* which is based on dyeing periods of one to five minutes. These authors report strike ratings for vat dyes which may be closely related to IER values.

Initial Dyeing Rate—IDR

A value closely related to Initial Exhaustion Rate is Initial Dyeing Rate (abbreviated IDR) which is primarily a function of dye bath concentration and may be more easily understood by the practical dyer who, in formulating baths for continuous dyeing, must think in terms of ounces of dye per gallon rather than per cent dyeing. From any IER value, which is expressed as percentage of the initial dye in the bath exhausted per minute at the start of dyeing, one may calculate an IDR value, which is expressed as weight of dye absorbed per minute per hundred weight of cloth at the start of dyeing and which is independent of changes in dye bath volume or cloth weight. The equation showing this relationship for a given dyeing is:

$$IDR = \frac{(IER)\ (\text{Total Initial Weight of Dye})}{(\text{Cloth Weight})}$$

The relationship between IDR and IER is illustrated by the following example. In the dyeing of a given weight of cloth in a bath of a specific concentration the number of ounces of dye absorbed per minute per pound of cloth at the very beginning of dyeing (IDR) is the same whether the bath volume is 100 gallons or 10 gallons. However, the percentage exhaustion of the bath per minute at the very beginning of dyeing (IER) is much less for the 100-gallon bath than for the 10-gallon bath because the total amount of dye available is much greater in the larger bath.

An understanding of IDR values assists in an understanding of the meaning of dyeing rate from baths of specified concentrations, especially in continuous dyeing with short times of immersion. However, relative IER values for a series of dyeings, as used throughout this paper, are believed to have more direct use in selecting dyes for compound shades. This will be discussed later.

The "Intial Dyeing Rate" discussed in a previous paper by one of the present authors *(5)*, is essentially the same as the "Initial Exhaustion Rate" of the present paper. The latter term is to be preferred because it indicates that measurements were made on the dye bath which was exhausting and not on the fiber which was being dyed.

TABLE I

Color	% Dyeing 1:40 Bath	Oz. Dye Per Gal.	Initial Exhaustion Rate	Initial Dyeing Rate Lb. Dye/ 100 Lb. Cloth Per Minute	% Exhaustion at 2 Min.	10 Min.	45 Min
Vat Gray 2G Dbl. Pdr.	5%	0.167	29%/min.	1.45	27%	51%	69%
Vat Blue BLD Dbl. Pst.	5%	0.167	33%/min.	1.65	29%	57%	85%
Vat Blue BLD Dbl. Pst.	25%	0.83	15%/min.	3.75	13%	26%	40%
Vat Copper Brown Paste	5%	0.167	16%/min.	0.80	19%	34%	49%
Vat Olive Green BN Dbl. Pst.	5%	0.167	28%/min.	1.40	33%	65%	87%
Vat Jade Green N Dbl. Pst. ..	5%	0.167	47%/min.	2.35	41%	73%	90%
Vat Jade Green N Dbl. Pst. ..	25%	0.83	33%/min.	8.25	29%	54%	71%
Vat Olive R Dbl. Pst.	5%	0.167	18%/min.	0.90	18%	36%	50%
Vat Olive T Pst.	5%	0.167	41%/min.	2.05	33%	62%	78%
Vat Red BN Dbl. Pst.	5%	0.167	24%/min.	1.20	25%	45%	51%
Vat Violet RK Pst.	5%	0.167	32%/min.	1.60	22%	35%	38%
Vat Violet 4R Ex. Pst.	5%	0.167	>60%/min.	>3.00	53%	85%	96%
Vat Violet 4R Ex. Pst.	25%	0.83	29%/min.	7.25	29%	59%	83%
Vat Violet BN Ex. Pst.	5%	0.167	46%/min.	2.30	38%	68%	82%
Vat Violet BN Ex. Pst.	25%	0.83	31%/min.	7.75	25%	45%	60%
Vat Yellow GC Dbl. Pdr.....	5%	0.167	40%/min.	2.00	38%	68%	85%
Vat Yellow GC Dbl Pdr.	25%	0.83	25%/min.	6.25	25%	46%	58%
Vat Fast Yellow Dbl. Pdr.	5%	0.167	15%/min.	0.75	11%	19%	23%

Dyeometer Dyeing Data

In Table I are summarized the data on per cent exhaustion at various times, and data on the IER and the IDR values of several vat dyeings carried out in the Dyeometer. The purpose of these experiments was to tabulate data for the accurate comparison of the exhaust properties of a few vat dyes. No attempt was made to obtain complete exhaustion of the dyes or to exactly duplicate commercial dyeing conditions. The "equilibrium" exhaustion values at 45 minutes are of considerable importance when selecting dyes for processes such as jig dyeing, package dyeing, etc., where the dyeing period is long and they may be of some importance when selecting dyes for other processes.

It may be noted in the case of five of the dyes listed, for which both 5% and 25% dyeings were made and in which the initial dye bath concentrations were 0.167 and 0.83 oz./gal. respectively, that the IER was appreciably lower for the 25% dyeing. This variation in rate with change in bath strength may be typical of most of the vat dyes. That is, the lower the percentage of the initial dye in the bath which exhausts per unit time at the beginning of dyeing, the higher the initial dye concentration.

A further clarification of the meaning of "Initial Exhaustion Rate," as used in the present paper, should be made in connection with the data of Table I. The tabulated IER value for Vat Gray 2G, for example, is 29%/min. while the measured per cent exhaustion at *two* minutes was 27%. It may appear as

though there is a discrepancy between these figures; this apparent discrepancy exists because there is a rapid decrease in the exhaustion rate during the dyeing. Figure 1 shows this effect because the steepness of the dyeing curve continually decreases and the actual exhaustion at *two* minutes is much less than 58%, the exhaustion which would have taken place if the initial exhaustion rate had remained constant. Also, the per cent exhaustion in *one* minute is much less than 29% because the IER value of 29%/min. represents only the rate of exhaustion at the instant the fiber is entered into the bath; thereafter, the rate decreases rapidly and continuously. In the present paper, rate has been expressed in units of %/min. because minutes are the most convenient time units, but it could be expressed as well in terms of %/sec.; thus, 30%/min. is the same as ½%/ sec.

In order to determine if there is a correlation between IER values and "equilibrium" values, these two quantities, read directly from Table I, were plotted against each other in Figure 2. The curve shows that for some dyes there is a parallelism between IER and equilibrium but that for many other dyes the correlation is very poor. For some dyeing processes, a consideration of IER values may be more important than equilibrium exhaustion values in selecting dyes to be used together, whereas quite the opposite may be true of some other dyeing processes. The next section presents some experimental data to show the relationship between IER values and the results of some laboratory continuous reduced dyeings.

TABLE II
Laboratory Continuous Dyeing Runs

Run No.	*Dyes Used (0.167 oz./gal. each)*	*IER from Table I*	*Shade of End Relative to Beginning*
1	Blue BLD Violet RK	33%/min. 32%/min.	Substantially same shade
2	Blue BLD Violet BN	33%/min. 46%/min.	Very slightly bluer
3	Blue BLD Violet 4R	33%/min. >60%/min.	Distinctly bluer
4	Copper Brown Olive R	16%/min. 18%/min.	Same shade
5	Copper Brown Gray 2G	16%/min. 29%/min.	Distinctly less gray
6	Copper Brown Olive T	16%/min. 41%/min.	Distinctly less olive
7	Blue BLD Fast Yellow	33%/min. 15%/min.	Much yellower

Laboratory Continuous Dyeings

The laboratory apparatus described by Zimmerman *(6)* was used for these experiments. This apparatus, shown in Figure 3 and designated hereafter as the "V-box", is a V-shaped, Monel metal trough with an inserted baffle section to compress the dye bath into a thin V-shaped passageway through which the cloth passes. As used in the present experiments the passageway of the V-box has a dye bath volume of 850cc. The inserted baffle section of the V-box holds about three liters and is filled with water at the desired temperature to help maintain the dye bath at a constant temperature. The V-box is made to fit on a laboratory padder which pulls the cloth through the dye bath at a speed which can be adjusted to give the desired time of immersion.

The following procedure and data show how laboratory continuous dyeings by the reduced method were carried out in the V-box, using in each case a mixture of two of the dyes listed in Table I.

Cloth — A strip of 80x80 cotton print cloth, 5 inches wide, 15 yards long.

Dye Bath — 850 cc. containing:
0.167 oz./gal. each dye (unless otherwise indicated).
2/3 oz./gal. NaOH
2/3 oz./gal. $Na_2S_2O_4$

Temperature — 120°F.

Time of Immersion — 20 seconds

Time to Run 15 Yards — About 10 minutes

The dye bath was prepared by reducing 10 to 15 minutes in one-fourth volume at about 120°F. and diluting to full volume before adding to the V-box. The strip of cloth, attached to a leader which had been threaded through the V-box, was run through the bath. A test piece from the beginning and one from the end of the dyed strip were cut off. These two pieces were oxidized in hydrogen peroxide and acetic acid solution, soaped for twenty minutes and iron dry. Before making comparisons of these two test pieces for each run, they were permitted to hang in an air-conditioned room to establish moisture equilibrium.

The results of the continuous dyeing runs according to the above procedure are listed in Table II. Abbreviated dye

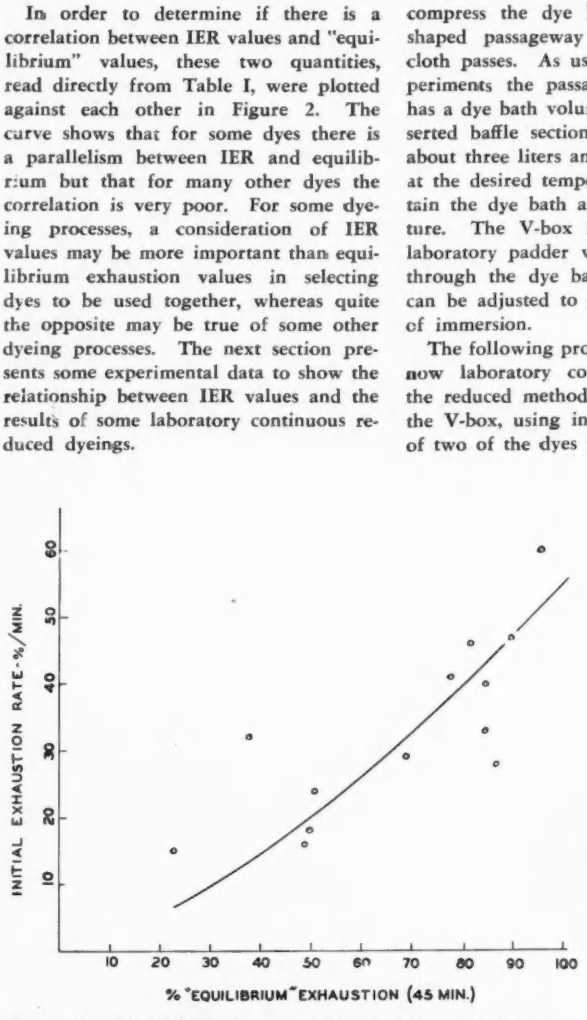


Figure 2—Initial Exhaustion Rate (IER) versus "Equilibrium" Exhaustion for 13 Vat Dyeings; Data from Table I.

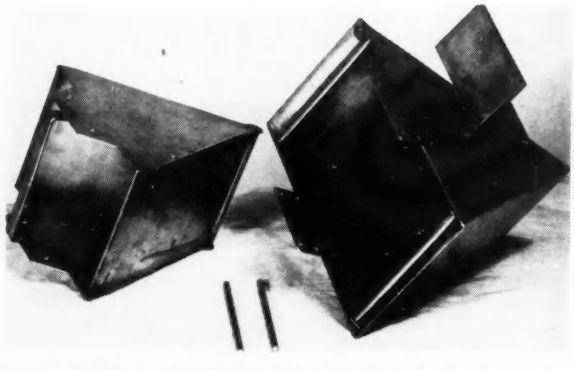


Figure 3—Component Parts of the "V-box" Dyeing Unit Used with a Padder for Laboratory Continuous Dyeing Studies.

names are used, but they are the same dyes which are listed in Table I. It was found, as expected, that the piece taken from the end of each run was lighter than the piece taken from the beginning because of exhaustion of the bath. The chief interest in these experiments, however, was the shade difference from beginning to end, since this shows whether or not the two dyes in each bath exhausted in equal percentages. The shade comparisons listed in Table II for the beginning and end of each dyed strip are based on spectrophotometric reflectance curves.

Runs 1, 2 and 3 listed in Table II for dye mixtures of Blue BLD with Violet RK, Violet BN and Violet 4R, respectively, show the relationship between IER values for each dye in a dye formula and the uniformity of shade during a dyeing run. If the two dyes in a mixture have equal IER values, the cloth remains on shade, whereas if one dye has a much higher IER value it will be removed from the bath more rapidly and the shade will shift toward the dye of lower IER during the run. On the basis of IER values, Violet RK and not Violet 4R should be used with Blue BLD; this is confirmed by the lack of shade change in Run 1 of Table II, while Run 3 became much bluer due to the more rapid exhaustion of Violet 4R. On the basis of "equilibrium" exhaustion values (Table I), the Violet RK—Blue BLD combination would not have been chosen, as shown by the dyeing curves in Figure 4 for Blue BLD, Violet RK and Violet 4R. These curves show further the difficulty of making accurate comparisons of IER by visual inspection of the initial portion of the plot.

When Violet BN, with an IER of 46%/min., is used with Blue BLD in place of Violet RK, whose IER (32%/min.) is the same as that of Blue BLD (33%/min.), the shade of the 15-yard strip is slightly bluer at the end of the run. This shows that while Violet BN works fairly uniformly with Blue BLD, it is somewhat inferior from this viewpoint to Violet RK at the concentrations used here.

Three more continuous reduced dyeings showing the proper and improper choice of colors are those using Copper Brown with three different olive-gray dyes (Runs 4, 5 and 6 of Table II). It can be seen by comparison with Table I that the Copper Brown-Olive R combination, which showed no shade change, happens to be an example which would have been predicted on the basis of either IER or equilibrium exhaustion, although the latter basis is not generally a sound one for this purpose.

On the basis of these results, one may draw the following conclusions with reference to continuous reduced dyeing for short time immersion:

A. Dyes which work best together are those which have similar initial exhaustion rates at the concentrations used, irrespective of equilibrium exhaustion values in batch dyeings.

B. In the case of some vat dyes, equilibrium exhaustion values show fair correlation with the IER values. In these particular cases, basing the choice of dyes for compound shades on equilibrium exhaustion data might give, fortuitously, satisfactory results. There are, however, many other vat dyes which show such poor correlation that the erroneous use of equilibrium exhaustion data instead of IER data would give unsatisfactory results. Equilibrium exhaustion data, therefore, should never be used as the basis for selecting dyes which are to be used together in continuous dyeing.

The foregoing discussion has been limited to the more obvious conclusions drawn from a consideration of the experimental data. The following discussion of some more general points is presented as answers to three questions which might be raised:

1. Since IER values vary with dye concentration (Table I), how can such data be appled to formulas where varying amounts of dyes are used?

2. What is the advantage of choosing dyes having similar IER's when, in principle, any two dyes could be used together, regardless of exhaustion rate, simply by using the proper feed to the dye bath?

3. Of what use are IER data in dyeing a shade which can be matched with only one combination of dyes?

The first question is concerned with the variation of IER values with dye concentration. It is probable that the IER for most dyes decreases with increase in bath strength, as shown by the plots in Figure 5. These data are taken from Table I for the five dyes which were dyed in the Dyeometer at concentrations of 0.167 oz./gal. and 0.83 oz./gal. Also shown in Figure 5 are three hypothetical curves (dashed lines) for a blue dye, Curve B, and two yellow dyes, Curves Y_I and Y_{II} which are used in the following simplified example. Let is be asumed that the two yellows differ in exhaustion rate as shown, but are alike in shade and other properties. Let it be asumed further that we wish to dye the green shade obtained by a 20-second dip-dyeing in a bath con-

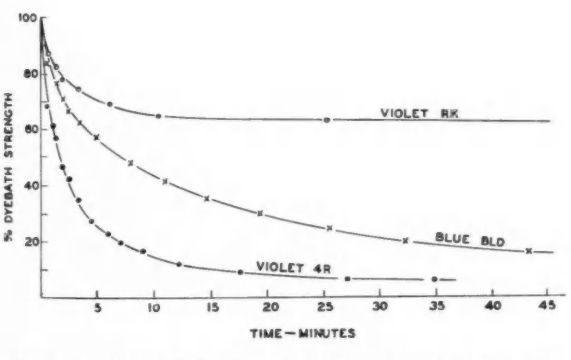


Figure 4—5% Vat Dyeings at 120°F; Liquor Ratio—1:40.

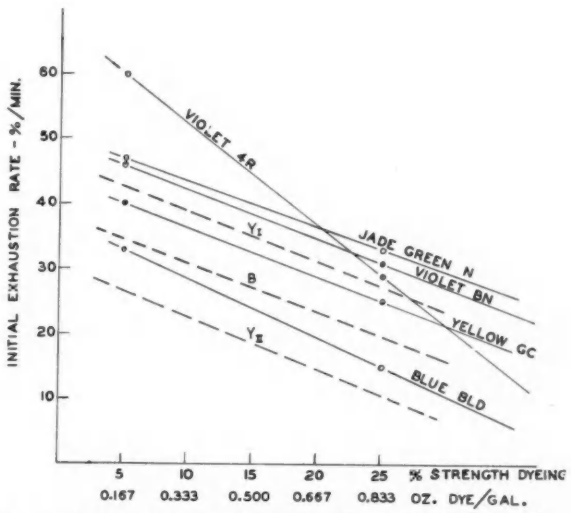


Figure 5—Effect of Dye Bath Strength on Initial Exhaustion Rate: Data from Table I.

taining 0.50 oz./gal. of blue and 0.83 oz./gal. of Yellow I. It would be expected from the IER curves of these two dyes that they would work well together at these concentrations in continuous reduced dyeing since the IER values are the same, 27%/min. In order to obtain the same green shade using Yellow II, it would be necessary to use much more than 0.83 oz./gal. of this dye because of its much lower dyeing rate; such a bath, however, would not be suitable for continuous reduced dyeing because the IER for such a high concentration of Yellow II is much less than that of the blue and the shade would become yellower during the run. If, now, we wish to dye continuously a new shade from a bath containing 0.50 oz./gal. of blue and a small amount of yellow, it might be supposed, based on our experience with the above green shade, that we should use Yellow I since it worked well with the blue. Such a conclusion is entirely wrong, however, because very low concentrations of Yellow I have much higher IER values than the 0.50 oz./gal. blue bath while very low concentrations of Yellow II are about the same as those for the blue. Therefore in this new shade of blue shaded with yellow, the dye, Yellow II, should be used instead of Yellow I.

The results of some laboratory continuous reduced dyeing runs using different concentrations of dyes are given in Table III. These dyeings constitute an experimental test of the principles discussed in the above example. Runs 7 and 8 for Blue BLD—Fast Yellow baths are as expected from the IER values; Run 7 became much yellower because of the faster exhaustion rate of Blue BLD. In Run 8 the concentration of Blue BLD was five-fold greater than in Run 7 and the IER value is now the same as that of Fast Yellow; the dyeing, therefore, showed practically no change of shade from beginning to end. The two dyeings using Blue BLD and Violet 4R were not entirely as expected. Run 3 became much bluer as predicted from IER values, but Run 9, which should have remained on shade, also became bluer, although the IER of Violet 4R was only 29%, nearly the same as that of Blue BLD. The reason for this has not been thoroughly investigated but there is considerable evidence that two vat dyes when used together do not always behave as individuals. The nature of the interaction between dyes and the effects of such interaction on the dyeing of compound shades are being studied further.

The second question is concerned with the objections to using dyes having widely

TABLE III
Laboratory Continuous Dyeing Runs

Run No.	Dyeing Formula Dyes	Oz./Gal.	IER from Table I	Shade of End Relative to Beginning
7	Blue BLD	0.167	33%/min.	Much yellower
	Fast Yellow	0.167	15%/min.	
8	Blue BLD	0.83	15%/min.	Substantially same shade
	Fast Yellow	0.167	15%/min.	
3	Blue BLD	0.167	33%/min.	Much bluer
	Violet 4R	0.167	60%/min.	
9	Blue BLD	0.167	33%/min.	Bluer
	Violet 4R	0.83	29%/min.	

different IER's. Theoretically, it should be possible to use any two dyes regardless of IER values and to maintain a uniform shade by proper adjustment of the feed. In practice there are many factors which make it difficult to control the shade when the individual dyes in a formula vary widely in their dyeing behavior. There are unavoidable variations in the cloth itself as it enters the dyeing process. Temperature controls, liquid level controls, and chemical feeding devices do not operate with perfect precision. These factors exert a stronger influence on the uniformity of shade when dyes which differ widely in initial exhaustion rate are used than when the dyes possess substantially the same rate.

The third question is concerned with the problem which faces the dyer when a new shade is to be formulated. In rare cases it may be possible to match the shade only with a specific combination of dyes. In such instances there is no alternative but to use that dye combination irrespective of exhaustion rates or equilibrium exhaustion values and to control the feed liquor as accurately as possible in order to hold the desired shade. Even in such a case, however, a preliminary estimate of the relative dye concentrations needed in the feed liquor may be made with better accuracy if IER data are available than if only the more common equilibrium exhaust data are available.

Application of IER Data to Other Dyeing Processes

The necessity for selecting dyes with substantially the same IER varies somewhat with different dyeing processes. IER data should be useful in choosing dyes for light shades to be produced on stock or yarn in pressure circulating machines or on yarn in skein form. Dyes with a low IER should most easily give level dyeings, since they will not tend to dye heavily on the layers of material with which the dye bath first comes in contact. If dyes with low IER cannot be used for a specific shade, then at least dyes with a similar IER can be chosen. If dyes with a very high IER must be used, then the IER in the presence of retarding agents can be determined and on the basis of such data, practical dyeing formulas can be evolved.

While this paper is confined to a study of "initial exhaustion rates" of vat dyes, the same concepts probably are applicable to the dyeing of other classes of dyes such as Directs, Sulfurs, etc.

Summary

A knowledge of the exhaust behavior of individual dyes assists in developing formulas containing dyes with known and similar properties and promotes trouble-free dyehouse operation. Certain exhaust properties of several vat dyes have been determined from Dyeometer dyeings on cotton cloth. Direct inspection of dyeing curves yields useful data such as the exhaust value at "equilibrium" or at some intermediate dyeing time. Another important characteristic of the dyeing curve is the rate of exhaustion in the first few seconds of dyeing. By graphical and mathematical procedures, this "Initial Exhaustion Rate" (IER), expressed as percent of the total dye concentration exhausted per minute at the very beginning of dyeing, has been calculated for each Dyeometer dyeing. Continuous reduced dyeing experiments have been made in a laboratory unit using mixtures of dyes having various IER values. Results show that IERs are more useful than equilibrium exhaust data when choosing dyes which will work well together. IER data are believed to be valuable in certain other vat dyeing processes as well as in continuous reduced dyeing.

IER data should be useful also in the application of other classes of dyes by certain processes.

References

(1) Boulton and Morton, J. Soc. Dyers Colourists, *55* 481 (1939).
(2) Rabold et al, Am. Dyestuff Reporter, *30* 696 (1941).
(3) Clark, Am. Dyestuff Reporter *34* 546 (1945), Calco Technical Bulletin No. 785.
(4) Kienle, Royer and McCleary, Textile Res. J. *16* 616 (1946), Calco Technical Bulletin No. 792.
(5) Royer, McCleary and deBruyne, J. Soc. Dyers Colourists *63* 254 (1947); Textile Res. J. *17* 438 (1947), Calco Technical Bulletin No. 795.
(6) Zimmerman, Textile World, Dec. 1947, Calco Technical Bulletin No. 793.

BLOCK PRINTING

P. CHADWICK

ANY talk on block printing would not be complete without some reference being made to its historical, traditional, and mythological background. The beginnings of the art of ornamenting fabrics by the stamping or printing on of colored designs are lost in antiquity. The art is usually assumed to have originated in the Far East, where the Hindus and Chinese are known to have practiced hand printing with wood blocks from the earliest times. However, recent discoveries in the Pyramids and other Egyptian tombs of fragments of cloth undoubtedly decorated by some process other than dyeing alone prove fairly conclusively that the ancient Egyptians also were acquainted with some form of the art. The general opinion today is that the Chinese were the first people to practice letterpress printing, while the Hindus were the first to practice the art of block printing on fabrics.

The source of modern European textile printing can be traced easily and directly to India, and consequently, as far as Europe is concerned, India is undoubtedly the true birthplace of the modern industry. From India it spread slowly westwards, through Persia and the neighboring countries, until it finally reached Western Europe towards the latter end of the seventeenth century.

Independently of the civilization of the Mediterranean, cloth printing was developed by the inhabitants of ancient Peru and Mexico. American Indians on the banks of the Orinoco practiced a craft similar in essentials to cloth printing. On ceremonial occasions the women printed designs on their hips and breasts by means of earthen stamps.

With reference to early discoveries, it is claimed that the peoples of the Caucasus printed textiles as early as 2000 B.C. Furthermore, it is claimed that these people also painted animal figures on cloths by means of pigments extracted from leaves, and it is assumed that the color in question was Indigo. It is also of interest to note that a wood printing block was discovered in the burial grounds of Achmin in Egypt, which appears to have been in use about the year A.D. 400. The interesting feature of this block is that it had a pattern at each end.

We may now turn to an important writing by Pliny the Elder in the year A.D. 23, which states that in Egypt cloths were painted in a most wonderful manner. After fulling, the white materials were painted, not with colors, but with substances which absorbed the pigments. After this was done there were still no signs of colors in the fabric. The cloths were then placed in a cauldron of boiling dye, and could soon be taken out as a patterned fabric. These writings appear to describe the essentials of madder styles.

Persian tradition of printing goes back to very ancient times, and we can trace the familiarity of the Persians with resist dyeing and even with the art of mordant printing. The fact that Christ figures in the Persian legend makes it appear probable that it was the Christian workmen from Egypt who formed a link with Persia. According to the old Persian legend, Christ is said to have been apprenticed to a dyer, and to this day the dyehouses of Persia are called the "workshops of Christ". Even among the Mohammedan Persians, Christ still remained the patron of dyers and printers.

With further reference to India, it is claimed that cotton was painted or printed by the peoples of India in the 4th century B.C., and that such cottons imported from India were exceedingly popular in China by 140 B.C. It appears that the ancient inhabitants of India enjoyed an advanced degree of civilization, and were by no means lacking in skill in the application of colors to woven tissues. In fact, they are to be greatly admired in the way they produced these fast colored effects, such as the madder styles. They had not in their possession the modern technique of steaming to fix the dyes to the material, but had to employ the long and laborious method of printing aluminum and iron salts on to the cloth, which were in turn precipitated as their corresponding hydroxides by means of a pig's-dung bath. The general idea is a printing and dyeing technique.

This madder style owes its name to the fact that formerly madder was the chief dye used in its production. It still retains the old name, although madder has been replaced entirely by its synthetic competitor Alizarin, which is chemically identical with the essential coloring matter of the madder root. This style yields an extensive range of exceedingly fine colors, which are fast to both light and soap. It possesses an advantage over other printed and dyed styles in that various shares of red, pink, maroon, chocolate, and purple, together with black, can all be associated in a multicolor pattern, and dyed simultaneously by one operation and with a single dye, viz. Alizarin. In these multicolored effects advantage is taken of the property possessed by Alizarin of forming differently colored lakes with different mordants. Thus the colored lake produced with aluminium salts is red, while that with iron salts is black or purple according to the strength of the mordant. With mixtures of aluminium and iron mordants, various shades of maroon are produced, which become chocolate as the proportion of iron increases. When other dyes are introduced, such as Indigo, the technique of resist printing comes into operation, and wax is employed as the resist during the dyeing operation. It is claimed, however, that the Hindus used clay as the resist.

India was fortunate in having many natural resources at her disposal. For example, the chintzes were given a mild bleaching treatment, the material being subjected to a weak solution of buffalo's milk and then allowed to dry in the sun. The fatty matter from the milk increased the brilliancy of the madder red.

India's aluminum mordant came from casha leaves in the form of aluminum tartrate. Her iron mordant was prepared as follows:—Pieces of iron ten times larger than an egg were made into a heap and subjected to heat, the best fuel being banana leaves. The red-hot iron was allowed to cool. The metal was then placed in a vessel, and hot canji poured over it *(canji* is water in which rice has been boiled).

* Presented at meeting of London Section, Society of Dyers and Colourists, December 5, 1947. Reprinted from their "Journal", August, 1948.

This was then exposed to the sun for several days, and the canji decanted. The vessel was then filled with coconut-palm wine, and the whole exposed to the sun for several days. The iron mordant was then ready for use.

Indigo was reduced with the seeds of the tavarei plant—probably this was a fermentation vat.

Between 1630 and 1640 Portuguese merchants were the first to introduce painted and printed textiles into Europe from India. After long voyages, with danger from both the ships and their crews, the merchants reached Europe. They told strange stories of the distant lands which they had visited, and offered cloths for sale which were painted and printed with all the wonders of India, and for which they demanded prices as high as if they were selling cloths of gold and silver. The warm, brilliant colors, which were of amazing fastness, and the fantastic patterns, with their fabulous animals, gods, and flowers from the Oriental fairy tales, aroused universal admiration.

It may be of interest to note that about the year 1664 the various East India companies were formed, including the Netherlands, Danish, French, Swedish, and English companies. The German efforts in this connection met with no lasting success. It was characteristic of all these companies that they were not under direct government control, but they could always be sure of government support, as they were regarded as a means of acquiring colonial territory. The companies regarded trade as their principal object, although it was of paramount importance for companies to acquire suitable stations. Strategic points were frequently the occasion of embittered disputes between nations, and companies soon began to maintain troops to protect their interests. Colonial wars between France and England occurred during the second half of the eighteenth century, and at the end of this century most companies were abolished. About 1664 it became impossible for the Dutch East Indian Company to meet the large demand made for Indian printed chintz in Holland. The Dutch textile printers then began to imitate the Indian chintz by employing oil and water colors, which had been in practice in Europe for many years. The imitations printed in these colors were of inferior fastness, and were quite unable to bear comparison with the Indian prints. About the same time these Indian chintzes were imported into France, but were beyond the means of the common people. For this reason it was not long before the French manufacturers conceived a plan for the making of cheap prints in the Indian manner. These substitutes were, however, in no way equal to the printed fabrics of the East, in either design or color fastness. Quite unexpectedly, a decree was issued by the Government of France in 1686 forbidding the wearing of printed cotton materials. This ruined the rising printing industry, and factories had to be closed, printing blocks destroyed, and workmen dismissed.

It is believed that the first European printworks was founded near Amsterdam, where printing and dyeing were practiced according to Indian methods. One interesting feature of this period is that a Swiss printer from Basle and a German printer from Augsburg made the journey to Holland in order to study the process of printing in fast colors.

About the period 1760-75 two famous French printers, Wetter and Oberkampf, whose firms flourished for a great number of years, had artistic ambitions. During this time some of the famous Louis and Rococo designs were produced; in fact, the activities of these firms were of great importance to the economic life of France.

Up to this stage, block printers had passed through rather difficult times as a body, having no guild of their own, for difficulties invariably arose when it became necessary to decide which guild a cloth printer should join. The cloth printers were usually numbered among the painters, frequently among the joiners, and were sometimes placed in the company of goldsmiths. It is believed that during the period of 1686 some of the Huguenot craftsmen migrated to England, and it is claimed that block printing first started in England during the year 1690 at Richmond-on-Thames, where some of the French immigrants were employed. Block printing was practiced also in Crayford (Kent) in the year 1706.

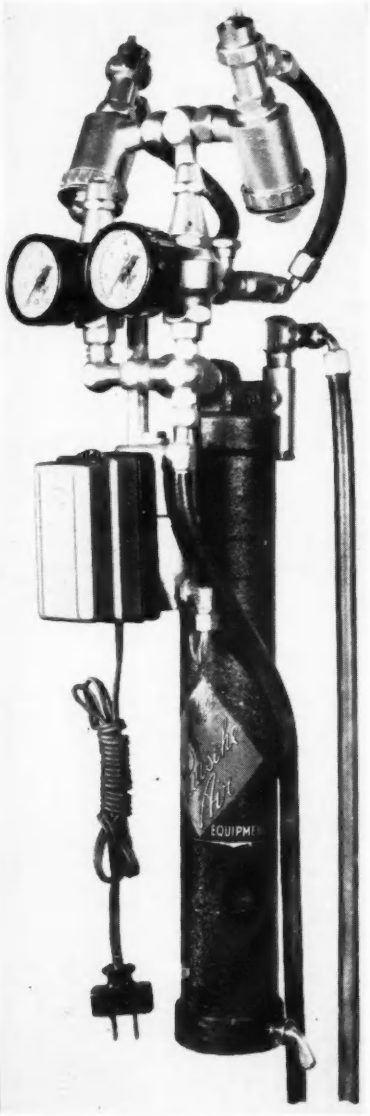
Let us now go back to the year 1400, when a printer's workshop consisted of two benches or tables placed at some suitable distance from each other. A wood frame, which was the means of registration of the block, was placed so that it just rested on the edges of the two tables. Under the frame was the cloth to be printed, which was tightly stretched. The square printing block, which was just a quarter of the frame in size, was then inked and placed in one corner of the frame. By means of a small board the material was rubbed against the block from the underside, thus transferring the pigment from the block to the material. The process was repeated until the whole square was completely covered. The nuns of the Convent of St. Catherine in Nuremberg adopted a similar method. They employed a frame in which the block was placed. The block was then pressed on the material, which lay on a hard, unyielding surface. In later years longer tables were used for block printing; the cloth was fastened down on the table and printed. The printer's assistant (who is called a *tierer)* smeared the color on the block by means of a glove, and the printer then transferred the color to the cloth by striking the block with a mallet. In more recent times the tierer applied the color to a pad which was stuffed with horsehair, then pressed the block on to the pad, and passed it on to the printer, who in turn applied it to the fabric.

Before the present-day technique of block printing is dealt with, some reference should be made to the printers' blocks. Formerly wood was used exclusively for the making of fabric-printing blocks. From time to time demands arose for more delicate patterns, so metal was gradually introduced, and today we have various types, such as wood, flocked, coppered, coppered and felted, and cast metal blocks. Blocks are generally made of a fairly hard, close-grained wood such as sycamore, and it is customary to make them in two or three ply, care being taken to see that the grain of each piece of wood runs in a different direction. These pieces of wood are glued together, and before the glue sets, the block is placed under pressure. The shape and size of a black for hand printing vary according to the width of cloth to be printed, the uses to which it is ultimately to be put, and the planning of the design with regard to its vertical and side repeats. If, for instance, cretonne cloth 30 in. wide is employed, the side repeats of the pattern must naturally be some factor of 30 in. in order to allow for some whole number of repeats to be fitted into its width. The vertical repeat of a pattern is quite independent of the width of its side repeat, and may be any convenient length desired. It must be remembered, however, that the larger the block the more difficult it is for the printer to adjust his block accurately. As a general rule the wood blocks for textile printing are 2.5-3 in. thick, for the reason that the thicker they are, the less liable are they to warp or crack, or to twist out of shape by the prolonged contact with wet color.

Although block cutting, generally speaking, is only a refinement of the primitive art of carving in flat relief, its successful accomplishment for the purpose of textile printing calls for the utmost care and attention on the part of the worker, and demands of him a sureness of eye and a delicacy of touch that can be attained only by long practice and experience of the craft. The first step taken in pattern making is called *putting on*, or transference of the pattern to the block. For this purpose a careful outline tracing of the design is made with a suitable marking ink on transparent tracing paper, which is then laid downwards on the smooth, level surface of the block, the design being transferred thereto by rubbing the tracing paper gently from the back with the thumb-nail or some suitable burnisher. The putting

(Concluded on Page 840)

TRADE NOTES • NEW PRODUCTS



Paasche Air Unit

• New Humidifying Units Announced

A new line of humidifying units, reportedly suitable for atomization of water, chemicals, insecticides, perfumes, and the like, is being marketed by the Paasche Airbrush Company, 1909 Diversey Parkway, Chicago 14, Illinois. Claimed to be an inexpensive but dependable moisture and humidity control, the new units are said to maintain moisture uniformity.

Health and fire protection are two of the notable advantages of using these humidifying units, the company states, and by eliminating dry and dusty working conditions the dangers of spontaneous combustion are minimized. Static electricity is reportedly grounded and respiratory ailments such as colds are said to be reduced, with worker "absentee-ism" due to these ills greatly curtailed.

Available in three sizes, the new Paasche units are said to diffuse up to one, two and three gallons of water or other liquid per hour, respectively. These capacities are claimed to be sufficient to control the humidity within 2 per cent fluctuation in areas of 15,000, 30,000 or 45,000 cubic feet of space. The required air pressure is six cubic feet per minute at 40 pounds, supplied by any suitable air compressor.

Complete data are available.

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• Owens-Corning Award to Miller

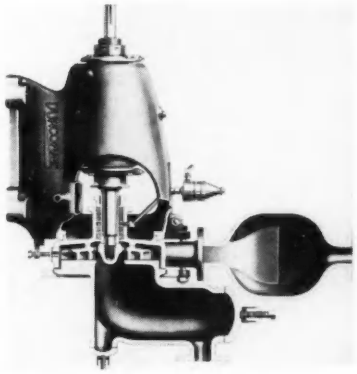
The award of the Owens-Corning Fiberglas Corp. scholarship to Arthur P. Miller, member of the class of 1951 at the Lowell Textile Institute, has been announced by Dean G. Nathan Reed.

The scholarship carries full tuition and $500 per year for expenses for both the recipient's junior and senior years, plus the opportunity to work summers in either of the donor's two plants. The scholarship is awarded annually on the basis of grades, character, qualities of leadership and need by the regular scholarship committee of the Institute.

This year's winner, Arthur P. Miller, was a native of New York City but makes his home at present in Salt Lake City, Utah. In addition to maintaining a high scholastic level during his first two years, he has been active in class and extra-curricular affairs.

He is a member of the business staff of the school paper, "The Text," and the dramatic organization, "The Textile Players." He is currently treasurer of Omicron Pi Fraternity, and was formerly vice-president of his class.

Mr. Miller is majoring in Textile Engineering, General Manufacturing option, and plans to enter the distribution end of the industry upon graduation.



40 Series R Durcopump

• Self Priming Pump

The Model 40 Series R Self Priming Durcopump, a centrifugal self-priming pump made for handling corrosive solutions, has been introduced by the Duriron Company, Inc., Dayton 1, Ohio.

Plant tests conducted in accordance with Hydraulic Institute standards reportedly have shown these new pumps to prime in 22 seconds with a static lift of 15 feet. After being primed, they are said to have maintained dry vacuum as high as 28.4" Hg. It is said that with a static lift of ten feet, air was admitted to the suction line of a 1½"x1½" Series R Self Priming Durcopump at the rate of 54 cu. ft. per minute without breaking the prime. The air handling capacity of the new pump is claimed greater than that of any self priming pump on which comparative tests were made.

This new pump is available in two sizes, one with capacity ranging from 20 GPM against 81 ft. TDH to 160 GPM against 33 ft. TDH and the other with capacity ranging from 40 GPM against 125 ft. TDH to 240 GPM against 75 ft. TDH, when operating at 1750 RPM.

The company lists these features of this new pump: Availability in 12 Durco Corosion Resisting Alloys; conversion of wet end parts from one alloy to another without changing working dimensions or the power end; Teflon Seal cages in stuffing boxes for lubricant or liquid seal; micro-adjustment of impeller in casing; renewable shaft sleeves; corrosion resisting deflectors to protect bearing construction in power end; and elimination of impeller nuts.

The details on this new pump are given in Bulletin 816, which can be obtained by writing The Duriron Co., Inc.

The unit will reportedly treat up to 7,000 gallons per day of water directly. In a bypass arrangement, using a solution containing 5 per cent active reagent by weight, 5 parts per million of the reagent can be delivered to over 14,000,000 gallons of water per day, it is stated.

Catalog 62 describes operation, specifications, typical installations, and feed rates in hypochlorite service.

• Miss Carter Joins Southern Research

Miss Mary Eddie Carter, who recently received here M.S. degree from the University of Florida, has joined the Textile Section of Southern Research Institute.

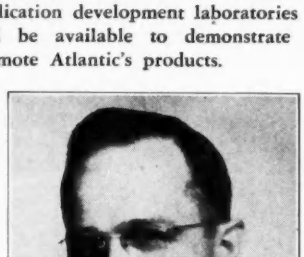
• Atlantic Technical Director

The Atlantic Chemical Co., Inc., Centredale, Rhode Island, has announced the appointment of James C. Shore to the position of technical director to take charge of application development, technical service, and sales promotion.

Mr. Shore was educated at Lowell Textile Institute and until recently was chief chemist of the Glenlyon Print Works, division of the Sayles Finishing Plants. Beginning his career with the United States Finishing Company, he eventually worked up through their various plants to become head chemist in the Sterling Branch and application research chemist in their central research laboratories.

Other posts held by Mr. Shore include technical service work with Calco Chemistry Division of The American Cyanamid Co., chief chemist of The Southbridge Finishing Co., Southbridge, Mass.; laboratory director of The Sterling Branch of U. S. Finishing Co., and an associate of The Milton Harris Research Laboratory, Washington, D. C.

Mr. Shore has done much work in practical textile application and development research. He will be in complete charge of Atlantic's new technical service and application development laboratories and will be available to demonstrate and promote Atlantic's products.



James C. Shore

• Nopco Awards

Charles P. Gulick, Chairman of the Board of Nopco Chemical Company, Harrison, N. J., has announced the winners of Annual Awards for the three best ideas submitted in the past year under the company's Suggestion Plan.

Top prize of $100 was won by Wilfred A. Mack, of Kearny, N. J., for an idea which saves considerable time in production.

Awards of $50 were made as follows: Louis Orlando, of Newark, N. J., for a suggestion involving installation of an alarm which eliminates the possibility of damage to certain equipment and to any material which might be in process; Messrs. Wm. Dissler and Ed. Gravenhorst, of Flemington, N. J., who jointly submitted an idea which resulted in speeding up production.

These annual awards are in addition to those originally paid the suggestors at the time their ideas were accepted.

The Suggestion Plan was introduced at Nopco in 1943, it is stated, in order that employees and the company might mutually benefit from ideas and suggestions offered by employees for the improvement of any phase of the business, whether or not connected with the employee's own work. Cash awards range from $5 to $200, and every suggestor receiving an award during the year becomes eligible for consideration in the annual competition, the company states. Many employees reportedly have enjoyed both satisfaction and profit from seeing their ideas put to work.

• Sunlight And Fade-Ometer Equivalents

A new card gives the Sunlight and Fade-Ometer equivalents and the minimum Fade-Ometer hour requirements for a textile fabric to pass the Hatch Textile Research Laboratory (25 E. 26th St., New York 10, N. Y.) as satisfactory for normal use.

These cards reportedly are the answer to queries that come up from time to time as to what constitutes a good delivery on a colored textile used for a specific purpose, and are said to represent thirty-one years of experience with these tests and their adaptability to practical use.

Herbert H. Hatch, Director of the firm, has had considerable experience in conducting tensile strength tests on men's wear and women's wear. Through these studies a fair average of minimum tolerances reportedly has been arrived at and considered reasonable in judging the serviceability of a textile fabric when breaking load is to be considered.

Copies of these tables may be had on request.

S. Y. Stribling

• Stribling Joins Warwick

Ernest Nathan, President of Warwick Chemical Company, division of Sun Chemical Corporation, announces the appointment of S. Y. Stribling as Southern Service Manager for Warwick's line of Suntone Textile Pigment Colors and Clears. Mr. Stribling will make his headquarters at the Warwick Chemical Company Application Laboratory located in Rock Hill, South Carolina.

After graduating from Georgia Tech, Mr. Stribling was associated with the Southern Bleachery and Print Works for many years. Following that he was Technical Representative for Interchemical Textile Colors Division in Rock Hill.

• DuPont Exhibit

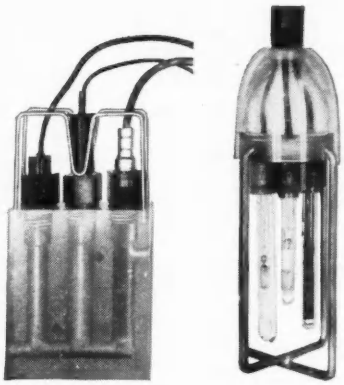
Advances in dyeing and printing—some still in the laboratory stage—were shown at the Du Pont Company's exhibit at the A. A. T. C. convention this year.

The exhibit was set up in the company's regular exhibition area at 1123 Boardwalk. Du Pont also had reserved booths on the convention exhibition floor in the Hadden Hall Hotel, but those were converted into a lounge for the convenience of convention-goers.

Among the company's exhibits were: new methods for applying acid colors to wool and vat colors to acetate rayon and cotton and rayon ribbons or tapes, a display of synthetic fibers (Orlon and Fiber V as well as fibers of other companies), advances in dyeing techniques, advantages in dyeing nylon in closed jigs, a knit goods panel, chemicals, pigments, flame-retardants and many others.

• Hooker Promotes Miller

Harris C. Miller has been promoted to the sales staff of the Hooker Electrochemical Company. He is assigned to the New York City Sales Area with headquarters at 60 East 42nd Street. Mr. Miller has been associated with Hooker since 1941 in various capacities, including process study engineer, and on special plant engineering and production assignments.



L and N pH Electrodes

• New Waterproof pH Electrodes

Two new pH electrode assemblies for use with L&N Recorders and Controllers, announced by Leeds & Northrup Company, 4934 Stenton Avenue, Philadelphia 44, Pennsylvania, feature waterproof design. One assembly is for continuous sampling lines; the other for immersion in open channels and tanks.

The sampling line assembly reportedly has low capacity which permits a high flow rate and minimizes the coating of electrodes by suspended material. Operating pressure can be up to 15 pounds, it is stated. Body of the assembly is a single block of clear plastic, 4¼" x 1⅜" x 4¾". Inlet and outlet connections fit standard ¼" pipe.

The immersion unit, it is said, can be used at a depth of ten feet or greater with longer lead wires. The assembly consists of a plastic head, measuring elements, supporting pipe (not supplied) and a junction box. The unit is supplied with a steel bar guard. A perforated sheet metal guard is available if desired.

The electrodes and temperature compensating elements are also new and feature lead wires molded into plastic heads to prevent electrical leakage. All three elements (glass electrode, calomel electrode and temperature element) screw into place against neoprene gaskets.

• Dr. Jewett Honored

Dr. Frank B. Jewett, for many years vice president of the American Telephone and Telegraph Company and former president of the National Academy of Sciences, was named to receive the 1950 medal of the Industrial Research Institute, Inc.

The medal, established in 1945, is awarded annually for "outstanding accomplishment in leadership or management of industrial research which contributes broadly to the development of industry or the public welfare."

Announcement of the award was made by John H. Schaefer, president of the Institute and vice president of the Ethyl Corporation, at the closing session of the Institute's fall meeting here. Official presentation of the medal will be made at an Institute dinner in April.

Recipient of the medal for 1949 was Dr. Vannevar Bush, president of the Carnegie Institution of Washington and until recently chairman of the Research and Development Board of the National Military Establishment.

Dr. Jewett, who also served as president of Bell Telephone Laboratories from its incorporation in 1925 until 1940, had a distinguished career in industrial, academic and government research, and was one of the early pioneers in this field. He was president of the National Academy of Sciences from 1939 to 1947.

During World War II, Dr. Jewett was a major contributor to the activities of the National Research Council and the National Defense Research Committee of the Office of Scientific Research and Development.

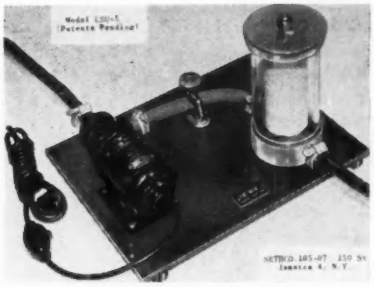
• ITT-Brush Contract

A contract for the production and marketing of the uniformity meter developed at the Institute of Textile Technology reportedly has been signed with the Brush Development Corporation, Cleveland, Ohio.

The uniformity meter, to be known hereafter as a uniformity analyzer, is an electronic instrument designed to measure and make a permanent record of the irregularities in weight per unit length of yarn, roving, and sliver. The instrument is calibrated for cotton, but with only minor changes reportedly may be adapted for the measurement of other materials such as wool, nylon, rayon, and various plastics. Material tested is not compressed or distorted in any way, it is stated. It is further stated that materials ranging from .08 to 150 cotton count may be measured with the one instrument, and yarn may be tested accurately at speeds up to 10 feet per second.

Mill trials conducted during the past several months are said to have indicated that the uniformity analyzer makes it possible to pick out drafting waves of various lengths and to locate defects in spinning due to maladjustment in equipment or worn parts. Applications of this instrument as a direct control device are said to be unlimited.

Announcements as to delivery schedules and prices will be made by the Brush Development Corporation.



Sethco Filtering Unit LSU-5

• "Pint-Sized" Filter Pump Units

Sethco, 105-07 150th St., Jamaica 4, N. Y., announces a new line of pint-sized filter pump units in various models priced to attract the laboratory or plant which filters small batches of industrial solutions. These units reportedly incorporate all the advantages of simple and economical operation characterizing the Sethco line.

The new models are recommended by the company for either continuous or periodic filtration of all industrial solutions. Less than two minutes are required to set them up, and filter tube replacements are long lasting and inexpensive, the company states.

Model LSU-5 is equipped with a type 316 stainless steel pump and a lucite filter. This model comes complete with a motor, pump and filter mounted on an indestructible, laminated, plastic panel. The 110 volt motor operates on either AC or DC and the entire unit is said to weigh only twenty pounds, making for easy portability. The maximum head developed reportedly is equivalent to a pressure of 18 pounds per square inch; or, put another way, the pump is capable of lifting a stream of fluid forty feet high. The progress of the filtration can be viewed through the lucite which is crystal clear.

The filter tube is made of specially processed cotton yarn, wound around a stainless steel core. This tube, it is said, will remove coarse and finely divided impurities as well as colloidal solids from the solution being filtered. The cotton filter tubes are reported highly resistant to both acid and alkaline solutions and are wound in different degrees of fineness. The company states that tubes may be obtained which will remove particles down to 1 micron in size and the results are brilliant, uniform, clear solutions. There is claimed to be no danger of channeling, which, in turn, is said to insure positive removal of impurities.

One of the distinct advantages of this unit reported by Sethco is that small quantities of solution as well as expensive solutions may be filtered without any loss. The filter itself holds approximately one

pint of fluid.

Sethco's Filter Model LSU-5 is reportedly rated at 50 gallons per hour and filtration rates of greater or lesser flows may be obtained by adjusting the pinch valve in the line.

The company asks that in writing for descriptive material one should mention the types of solution and the size of jobs to be filtered as well as the filtration temperature.

• Harris Research Appointments

Recent expansion and reorganization at Harris Research Laboratories, Washington, D. C., has resulted in the appointment of Dr. Alfred E. Brown as an Assistant Director of Research and Dr. Anthony M. Schwartz as Manager of the new Industrial Chemicals Division. Dr. Brown will direct an extended program of research in the field of protein fibers; Dr. Schwartz will supervise work on surface active agents and other industrial chemicals.

New additions to the technical staff of Harris Research Laboratories include Marian M. Hellstrom, formerly with Abbott Laboratories; Jacqueline M. Pritchard, from the National Bureau of Standards; and Nancy Jane Tucker, a recent graduate in chemistry from George Washington University.

• Wyandotte Presentation

M. J. Conway, Michigan Alkali Division Pittsburgh Office Manager, Wyandotte Chemicals Corporation, recently received a gold watch in recognition of his 25 years of service to the company. Mr. Conway was presented the watch by Bert Cremers, vice president of the Michigan Alkali Division.

Over 1,400 Wyandotte employees have, to date, received their 25-year watch award, 855 of these still being in active service. The watch presentation was made October 20 at a banquet attended by nearly 400 Wyandotte Chemicals personnel in the company gymnasium at Wyandotte, Mich.

Bert Cremers, left, and M. J. Conway

• Washable Wool Blankets

Wool blankets that reportedly can be washed over and over again without danger of felting or harmful shrinking have been developed by the Beacon Manufacturing Company in cooperation with American Cyanamid Company's Textile Resin Department. The new blankets are treated with Lanaset Resin to give them shrink resistance.

According to the United States Testing Company, test No. 12422, October 17, 1949, which subjected the new blanket to two successive U. S. Quartermaster's wool blanket tests (Series CCT191A), the blanket not only resisted shrinking, but its appearance and hand after washing were superior to that of the untreated blanket, which shrank badly and felted so that it was relatively stiff and boardy. These tests are said to be equivalent to ten household or laundry wool washes.

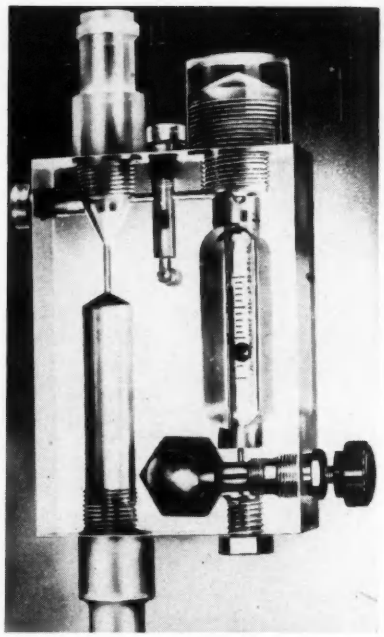
Although the Lanaset Resin process is reported to have been successfully applied to a wide range of wool apparel fabrics, this is believed to be the first time it has been commercially applied to blankets. The Lanaset treatment does not change the appearance or hand of the blanket, makes colors more lively, and in some cases actually increases its warmth, according to U. S. Testing Company results. Dry cleaning will not affect the finish, the company states.

The new blankets reportedly will be available in seven colors: dusty rose, light blue, maize, nile green, geranium, wine, and hunter green. They are 72x90 inches, 3½ lbs. in weight, with a 5-inch acetate binding, it is stated.

Manager R. E. Sumner, of the American Cyanamide Textile Resin Department, stated that the process is an additive one to wool and in getting under the scale structure, it adds stability and conditioning power. He further stated that the Lanaset process differs from ordinary chemical processing in that it does not alter scale structure.

• New Intermediate For Emulsifiers

A new technical Diethylaminoethanol, a low cost product developed especially for emulsion work, is now in production by Sharples Chemicals Inc., 123 S. Broad St., Philadelphia 9, Pa. This tertiary amine is said to form an azeotrope with water, improving water-spot resistance of wax films. It may be employed as a replacement for higher priced emulsifier intermediates with no quality reduction, the company states, and it may be used with lower cost emulsifiers to improve quality. It is suggested as an intermediate in making oil-in-water emulsions, self-polishing floor waxes, automobile, furniture and glass type polishes, emulsion paints, etc. Samples are available.



Fischer and Porter "Feed-Rator"

• New Compact Chemical Feeder

A new compact, self-contained chemical feeder (the "Feed-Rator") is now available from the Fischer & Porter Company, Hatboro, Pa. Of transparent acrylic plastic (measuring about 10" by 5" by 2" over all) this unit is said to simultaneously control, meter and dispense relatively small amounts of bactericides, catalysts, disinfectants, fungicides, inhibitors, reagents and other chemicals into a larger stream. The built-in educator reportedly takes the place of a pump, and many highly corrosive chemicals can therefore be fed directly from a container, the company states.

• Glyco Anti-Gelling Agent

Starch pastes are used as adhesives, sizings (stiffeners), thickeners and for other purposes. In some cases it is desirable to decrease viscosity and delay gelling. Both of these ends are reportedly attained by the addition of a small amount (0.1%) of Flovis, a new anti-gelling agent manufactured on a tonnage basis by the Glyco Products Co., Inc., Brooklyn, N. Y. The use of Flovis in starch pastes is said to give creamier, smoother and softer products which are easier to use and handle. No reduction in solids content is necessary to get better flow, it is stated.

It is also stated that in packaging starch adhesives, the greater fluidity induced by Flovis enables faster packing and labor saving.

• Cotton Testing Lab in Operation

The new cotton fiber testing laboratory recently established in Memphis, Tennessee, by the United States Testing Company, Inc. (main offices in Hoboken, New Jersey) is now in full operation. This new laboratory, believed to be one of the most modern and up-to-date in the country, is equipped with the latest type instruments for determining the strength, uniformity, and fineness of cotton, as well as equipment for a number of physical tests on textile yarns and fabrics.

The laboratory is also said to be equipped with the latest type industrial air conditioning which maintains a standard atmosphere required for fiber and textile testing and staffed with technicians having many years of experience in both the main laboratories of the United States Testing Company, Inc. and laboratories of the United States Department of Agriculture.

• Chemical for Stabilization of Cellulosic Fabrics

A chemical to impart stabilization and crush resistance to cellulosic fabrics, said to be entirely new and unique, has been announced by Rohm & Haas Company. Offered under the trade-name Rhonite R-1, the chemical is reported to have exceptional durability so that fabrics treated with it are completely washable. It is the result of extensive research and development in the company's textile laboratories. According to W. J. Thackston, Jr., sales head of the textile chemicals department, it has been thoroughly tested and evaluated in plant applications.

"The stabilization and crush resistance imparted to cellulosic fabrics by Rhonite R-1," Thackston said, "are more durable to repeated washings than the same qualities imparted by the conventional urea formaldehyde or melamine formaldehyde resins. The stabilization, in fact, approaches that imparted by the purely chemical modification of cellulose with aldehydes, while at the same time crush resistance is superior to that obtained by those methods, and application control is of the same order as with conventional resin treatments."

Rhonite R-1 is recommended by the company for stabilization and crush resistance of rayons and rayon blends where exceptional durability to repeated laundering is desired. Stabilization of cotton reportedly may be obtained with as low as 3-4 per cent applied solids.

The chemical is available for shipment in commercial quantities, packed in 500 lb. drums, and priced at 33 cents per pound, f.o.b. Philadelphia, the company states.

• Dr. Markush Elected Pharma Head

Pharma Chemical Corporation (New York, N. Y., and Bayonne, N. J.), has elected Dr. Eugene A. Markush as president of the corporation.

Dr. Markush was the founder of the corporation which was organized in 1919, and was its former vice-president and technical director. He succeeds Charles M. Richter, whose holdings were acquired through the efforts of Mr. Joseph Rosenthal, accountant for the company.

The company has engaged Mr. Richter to act in an advisory capacity. Arthur C. Hahn will continue in charge of the financial affairs and Oscar K. Schwarz in charge of sales.

• Synthetic Detergent Folder

"Synthetic Detergents — Their History and Applications" is the title of a new descriptive folder issued by Antara Products, General Aniline & Film Corporation, 444 Madison Avenue, New York 22, N. Y.

Reportedly written in non-technical language, the folder is designed to acquaint laymen buyers of detergents with simple facts about these materials which are usually explained in heavy scientific terms.

The folder defines both detergents and synthetic detergents and explains the need for the latter in textile fields and other places where their outstanding properties help make better products at a lower cost.

The three general types of synthetic detergents — anionic, cationic and nonionic—are explained, along with the advantages of each type.

A chart gives the name, type, family and uses of 19 Antara Products Surface Active Agents known as the Antarox, Antaron and Antarano families.

Copies of the folder may be had by writing the company.

• Wild New Sales Manager

John G. Wild, specialist for the past twelve years in the field engineering of synthetic resin coatings, has been appointed assistant sales manager of Prufcoat Laboratories, Inc., of Cambridge, Massachusetts—manufacturers of special protective coatings.

• New Distilled Red Oil

Ahcolein 810, a new premium grade distilled red oil, has been announced as an additional fatty acid chemical specialty of Arnold, Hoffman & Co. Inc., Providence, R. I. Ahcolein 810 is reportedly a high quality distilled oil, very light in color and possessing an extremely mild fatty odor. Its use is recommended by the company when quality, odor and final color are important factors. Samples and technical data sheets are available on request.

• L. Sonneborn Sons Removal

L. Sonneborn Sons, Inc., New York, New York, has announced the removal of several divisions as well as the Executive and general offices to 300 Fourth Ave., New York 10, N. Y. Among the divisions affected are: White Oil and Petroleum, Amalie Motor Oil, Textile Chemicals and Export.

The Building Products Division will remain at 80 Eighth Ave.

• Rodney Hunt Southern Office

Rodney Hunt Machine Co. of Orange, Massachusetts, manufacturers of textile wet finishing machinery for 109 years, has established a Southern office in the Woodside Building, Greenville, South Carolina. T. W. Kitchen will manage the new office.

• Film Adhesives Booklet

Users of transparent films should be interested in a new booklet announced by the National Adhesives Division, National Starch Products Inc., 270 Madison Ave., New York 16, N. Y. "How to Handle Adhesives for Transparent Films" is reportedly the first comprehensive and authoritative printing on this subject in more than a decade in which strides have been made both in the application of new transparent films and the high speed machinery required to fabricate films into bags, boxes, wrappings, etc.

A feature of the booklet is the chart describing the properties and characteristics of all principal types of transparent films including cellophane, pliofilm, polyethylene and cellulose acetate.

Copies are available free upon request from any of the offices of National Adhesives located in the United States and Canada, or Slough, England and Veendam, Holland. They may also be obtained from National Adhesives at the above address.

• New Sulfur Dioxide Plant

The Tennessee Corporation, Atlanta, Ga., is currently building a new liquid sulfur dioxide plant at Copperhill, Tenn. The new plant, which is expected to be in operation by the first of January, reportedly will produce the highest available grade of liquid sulfur dioxide for shipment in bulk tankcars, multiple unit tankcars and various size cylinders.

• Feng Appointed

Appointment of Ivan Y. T. Feng, a 1949 graduate of N. C. State College, as a research associate in the College's School of Textiles was announced by Dean Malcolm E. Campbell.

Mr. Feng, son of C. T. Feng, Chinese ambassador to Mexico, is engaged in a research project designed to reduce neps in cotton fabrics. His appointment has been approved by Chancellor J. W. Harrelson, Acting President W. D. Carmichael, Jr., of the Consolidated University of North Carolina, and the executive committee of the board of trustees. He will work under the direction of Prof. John F. Bogdan, head of the School's Department of Research.

Mr. Feng was awarded his M. S. degree in textiles by State College last June. Previously, he earned his B. A. degree in economics at the University of California at Berkeley and his M. A. degree in business administration at Stanford University. He received his primary education partly in China and partly in Europe, where he studied in both German and Dutch schools.

He is a member of Sigma Tau Sigma, national honorary textile fraternity, the Tompkins Textile Society, professional organization for students of textiles at Sta[illegible] College, and the Cosmopolitan Club.

—♦ ♦—

Block Printing—

(Concluded from Page 834)

on is now completed, and the hand cutter proceeds to remove the ground and to preserve the pattern in relief. With copper blocks the process is slightly different. The design, instead of being cut out of solid wood, is built up on the flat surface of the block in strips and rods or pins of copper or brass. By this method the spots and lines can be obtained easily, and are of ample strength to withstand the shocks of printing. Moreover, many little delicate forms which are impracticable or too fine to cut on an ordinary wood block are easily made by simply inserting short pieces of copper rod corresponding in section to the shape desired. In addition to the two methods of block making already described, the third method, viz. the casting of metal blocks, is frequently employed for small patterns and those made up of many similar detached objects; cast metal blocks are employed also for reasons of economy to put several repeats on to the same block.

The most successful way of making a mould is to burn out the pattern in a piece of wood. The heated alloy is then poured into the mould, and on cooling the mould is tapped smartly on the back, when the casting comes away. A sufficient number of repeats of the pattern are made in this way, and then adjusted on a plain block of wood, so that they join or fit to each other exactly; they are then permanently secured to it by means of screws or nails. Finally the blocks are faced until all the castings are at exactly the same level.

In present-day block printing the apparatus required by the printer consists of the table, sieve, blocks, and maul. The printing tables are made of perfectly flat slabs of stone, slate, iron, or concrete, and are covered with a printer's woolen blanket; over this is a printer's skin, which is waterproof, and is supported on a strong rigid framework of iron. The printer's woolen blanket is resilient or elastic in character, so that it yields when the block is mauled. The length and width of the tables are governed by local conditions and styles. The sieve and swimming tub are so constructed on wheels that they can easily be pushed along. The sieve proper is an ordinary piece of wool felt, which is placed on a piece of thin mackintosh, this being fastened to a rectangular piece of wood, the whole of which is floating on the swimming tub. The swimming tub is filled with old color, the object being to provide the elastic support necessary to enable the color-charged woolen sieve, when placed upon it, to give up its color evenly and regularly to the block. In actual printing the material is fastened down to the table by means of pins, or is gummed down, and the sieve is then saturated with color, it being the tierer's job to brush this color on evenly. The printer now charges the face of the block evenly with color by pressing it twice on the sieve in different directions, and then applies the block to the cloth, ensuring a full impression of the pattern by striking it on the back with a heavy maul. The first impression printed, the tierer then recharges the sieve with color, and the printer proceeds with succeeding impressions in precisely the same manner, taking care to make each join up or repeat properly, by placing the pitch pins at the top and on the sides of the block exactly over those already printed. It is important that the first row of impressions, or prints, across the width of the cloth should be exactly at right-angles to the selvedge, otherwise the pattern, if properly fitted at the repeats, would gradually run off the edge of the cloth at one side, and tend to approach the center of the cloth from the other side. In short, it would be crooked and would require extra impressions to fill the cloth. The printer, therefore, rules guiding lines on the cloth for the first and sometimes also for the second row of repeats, and thus avoids any mistakes he might make if he trusted to his eye alone.

The Cordova design contains 18 different colors, and the printer has to lay 138 blocks per repeat. This particular design is an *eight-printer*, i.e. there are 8 blocks per color for each repeat, the size of the blocks being 15 in. × 15 in. Another example is the Phoenix Bird, which is a 25-color design, the printer having to lay 164 blocks per repeat. These two examples throw some light on the craftsmanship of block printing.

An interesting example of printing, showing how a pattern is built up, is the Jungle design. Commencing with the first color—the red outline—each individual color is printed until we come to the last, the yellow ground. This particular design has 15 colors, and on this particular example there are 30 blocks laid.

Mention may be made of some very important documentary hand-painted Indian chintz collected by G. P. Baker, an authority on the subject. The hand-painted fabrics which are the replicas of the documents can be seen in the Victoria and Albert Museum, London. These fabrics are madder productions, the mordants being painted on the fabric, and afterwards fixed and dyed.

Present-day designs, such as the Park Lane, Rococo and Lace, Phoenix Bird, Cordova, etc., are printed with Alizarin dyes, sometimes called "steam colors". These dyes are similar in character to those used in the madder process by the Hindus, only the technique is somewhat different. Whereas the Hindus used a printing and dyeing process, we today employ a printing and steaming process. The general lay-out regarding color is to mix the dye in some suitable gum and then to add the mordant. Gums such as dextrins or well calcined British gums are usually employed, which are in character long, good-flowing gums. Short media such as starch and gum tragacanth are not suitable for block printing. The mordants in general are aluminum, chromium, iron, and tin, usually employed in the form of acetates. The alizarin dyes and allied chrome dyes which are employed on these fabrics have something in common, and that is that the color molecules generally contain one, two, or three hydroxyl groups.

When the goods have been printed and dried, they are passed into a steaming chamber, where they are steamed for one hour. The steam has a dual function, for it gives off heat, which brings about chemical reaction, and condenses to water, which causes swelling of the fibers. This swelling is very important in god fixation of dyes. During the steaming operation hydrolysis of the mordant takes place, liberating free acetic acid, and the metal replaces the hydrogen atom in the hydroxyl group, when the true insoluble color lake is produced. At the same time we get migration of color particles into the inner structure of the cellulose molecule, and afterwards aggregation of these particles. Thus these dye particles, which have grown in size, are mechanically locked in the inner structure of the cellulose molecule.

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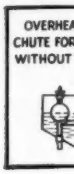

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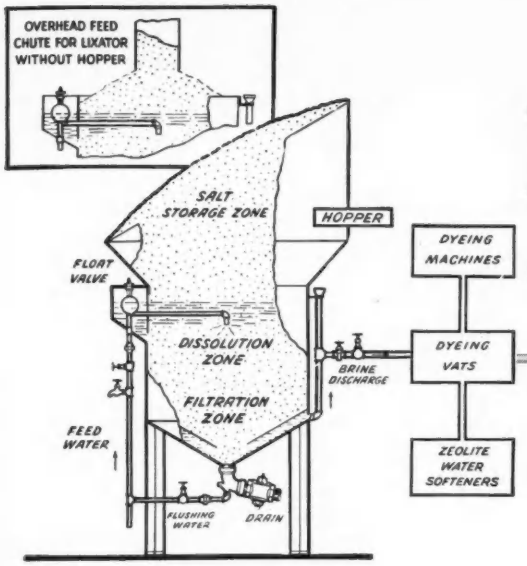

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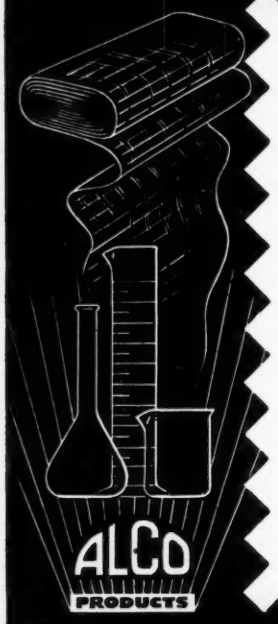

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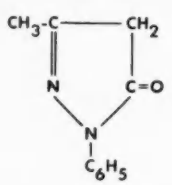

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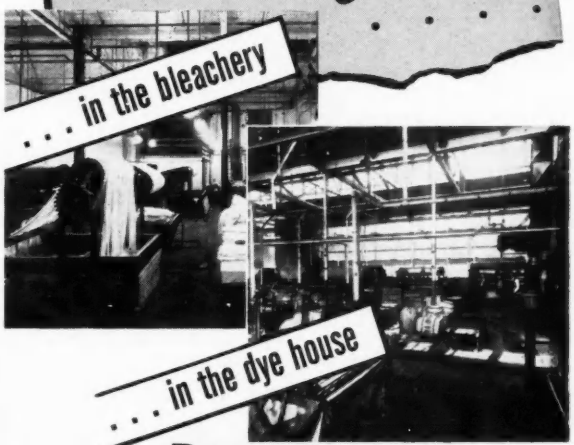

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WANTED — DYESTUFF SALESMAN: Long established Dyestuff Manufacturer and Distributor of a complete range of colors requires a SALES REPRESENTATIVE (preferably established in Philadelphia) for the PENNSYLVANIA and SOUTHERN NEW JERSEY TERRITORY. If you have a good knowledge of dyes, preferably with a printing, dyeing and finishing background, and have had selling experience, write giving full details including age and compensation expected. Our organization knows about this advertisement. Write Box No. 729.

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SALES REPRESENTATIVE AVAILABLE: Formerly with leading European Dyestuff manufacturer over 20 years experience, seeks position with progressive concern N. Y. area or Partnership in established business. Write Box No. 732.

Recent College or Textile School Graduate experienced in dyestuff application wanted for work in Research Laboratory. Write to J. K. Foley, The American Thread Company, Willimantic, Conn.

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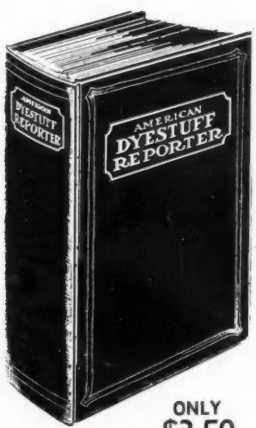

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***PARAMINE T A:** A cation active softener for processing cotton and rayon cloth to obtain a soft, smooth, pleasing finish.

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***PARAPON S A:** A highly efficient leveler and softener for dyeing and finishing all types of yarn, cloth and hosiery to produce a uniform dyeing and a soft full hand.

***ARIPEL F S:** Finish and gas inhibitor for processing dyed acetate rayon—produces a soft, full feeling finish and prevents gas fading of the color.

***LANITOL F:** A synthetic detergent possessing exceptional scouring and washing properties for processing wool, cotton, rayon or nylon.

***ALGEPON V A:** Auxiliary used in dyeing vat colors to retard reoxidation of the reduced bath and produce a solid and uniform shade—also effective in stripping vat dyeings.

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***DIAZONOL A C:** For boiling out cotton cloth in pressure or open kiers to produce greater absorbency and cleaner material. Excellent for pre-boiling knitted cloth in preparation for chlorine bleach. Also used with good results for boiling out cotton or rayon cloth on the jig.

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Technical GLYCERINE NEWS

FLAME-RESISTANT WORK UNIFORMS may now be made by use of an alkyd resin, according to the report of a government research laboratory. The alkyd (an important end-product of glycerine) is said to impart good laundering-resistance as well. (T-7)

★ ★ ★

TO PREVENT CLOGGING OF PRINTING SCREENS due to thickening agents which tend to dry, add glycerine to the print colors, one authority suggests. (T-8)

★ ★ ★

FOR SHARP PRINTS ON TEXTILES, a water-in-oil emulsion is claimed to be superior to the starch pastes used with conventional dyestuffs. A typical composition contains an aqueous dyestuff solution emulsified into a water-immiscible solution of film-forming substances, one of which is an alkyd resin. (T-9)

★ ★ ★

LONGER LIFE FOR NYLONS. Glycerine has become an important help in handling nylons in factory and retail store, according to an article published recently. Applied to the hands of machine operators and clerks, glycerine is said to prevent many of the snags which send a considerable proportion of the stockings to the scrap pile. (T-10)

★ ★ ★

A FUNGUS-PROOFING COMPOSITION for treating fibers made from cellulosic substances contains a hydroxyquinoline and an alkyd resin among other ingredients. Alkyds are important end-products of glycerine. (T-11)

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NEW YORK 17, N. Y.

I should like to know the source of those items appearing in Technical Glycerine News which I have checked below.

☐ T-7 ☐ T-8 ☐ T-9 ☐ T-10 ☐ T-11

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Result from
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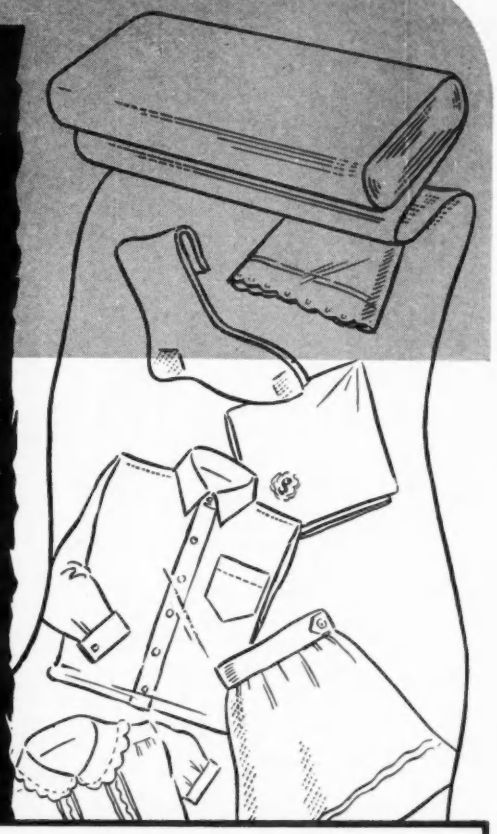
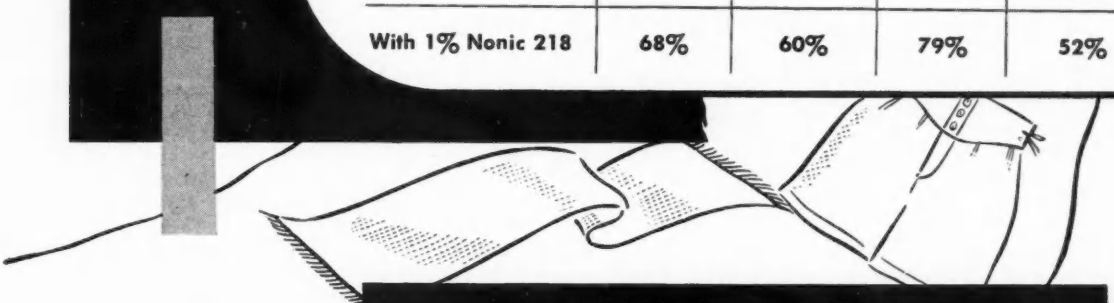


	Effect on Leveling		Effect on Penetration	
	Jade Green N	Olive Green BN	Jade Green N	Olive Green BN
Without Nonic 218	**56%**	**46%**	**40%**	**40%**
With 1% Nonic 218	**68%**	**60%**	**79%**	**52%**



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SHARPLES TRADE MARK CHEMICALS

Sharples Chemicals Inc.

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A partial view of new Butterworth "Bullet" Padder frames in early stages of assembly at Butterworth plant. Inset shows tanks for "Bullet" Padders prior to assembly.

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(2) Pressures can be varied from zero to 15 tons.
(3) Design makes tearing out of frames unnecessary.
(4) Can be used on rayon, cotton or wool.

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● Textile printing on cotton, silk, rayon and linen with vat soluble ester (indigosol-type), or acid and chrome formulations may now be improved by the use of Pfizer Ammonium Gluconate, Technical.

This non-toxic, non-corrosive catalyst is the stable, free-flowing crystalline ammonium salt of gluconic acid. Upon steaming, it decomposes to yield an efficient acid medium for the development of brilliant colors. Note these advantages of Pfizer Ammonium Gluconate, Technical:

1. **Ensures greater color value, more stable pastes, less tendering and brighter colors than other acid catalysts.**
2. **Complete neutralization assured with this neutral salt.**
3. **Non-volatility increases leveling and penetration of the color.**
4. **Dissolves readily in water for uniform distribution throughout print paste formulations.**
5. **A dry powder — its use eliminates returnable containers, and minimizes shipping charges.**

Potential applications for Ammonium Gluconate include the printing of stabilized azo colors and for the polymerization of textile resins. Pfizer Ammonium Gluconate, Technical is packed in moisture-proof fiber drums. Write today for samples and further technical information. Chas. Pfizer & Co., Inc., 630 Flushing Avenue, Brooklyn 6, N. Y.

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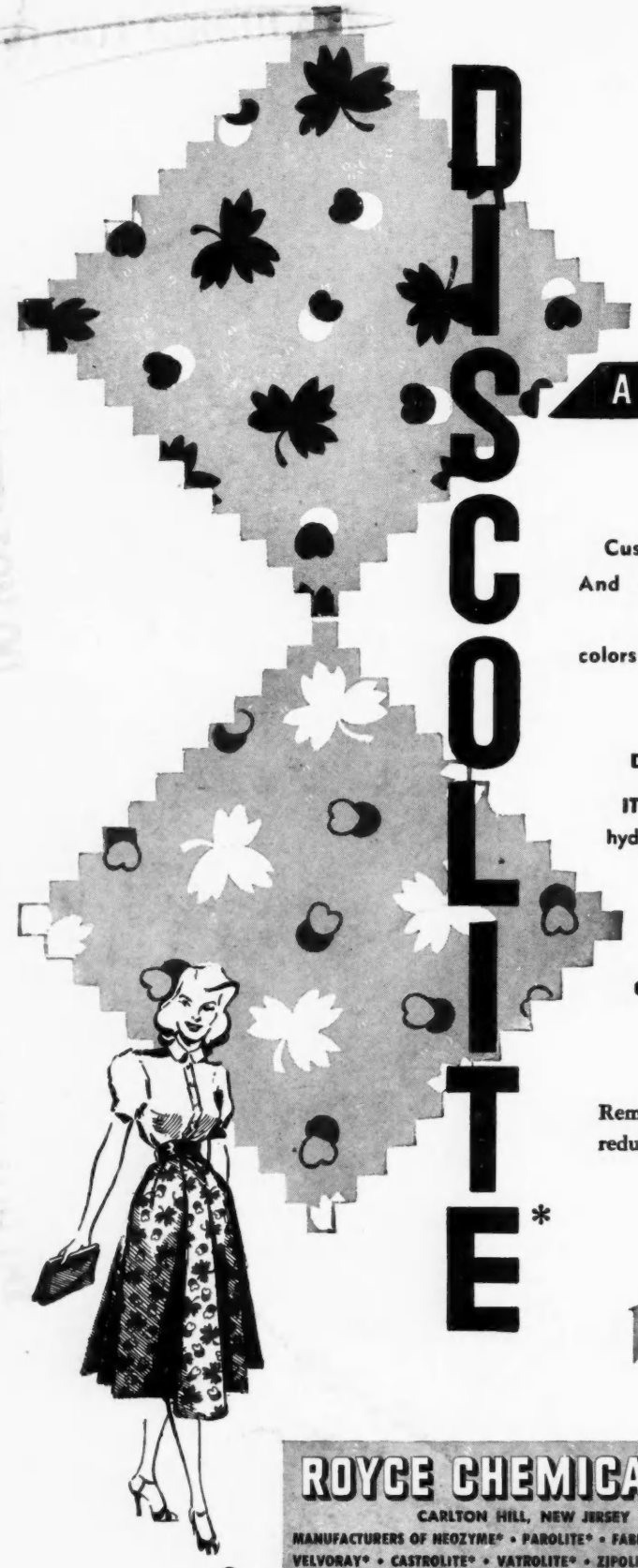

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